

AD-A215 133

# Center for Night Vision and Electro-Optics

AMSEL-NV-TR-0085

## REDUCED VOLTAGE AND RESTART TESTING OF THE 1-WATT INTEGRAL CRYOGENIC COOLER (HD-1033B/C/D)

by

FAR IR Engineering Team

SEPTEMBER 1989

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)  This final report describes and provides the data on the reduced voltage (108 VAC) and restart testing of the 1-Watt Integral Stirling Cooler. The 1-Watt Integral Cooler (HD-1033B/C/D) is currently used in the M1 FLIR, M60 FLIR, and the Advanced Attack Helicopter FLIR. The cooler specification requires that the cooler operate from 115 to 119 VAC. Because of the potential of lower voltage operation in some systems, C <sup>2</sup> NVEO evaluated the cooler performance and restartability at environmental extremes with 108 VAC. The coolers successfully passed all testing at all environmental conditions using both voltages.					
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DTIC TAB	<input checked="" type="checkbox"/>
Unannounced	<input type="checkbox"/>
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## SECTION I. PURPOSE

The CECOM Center for Night Vision and Electro-Optics (C<sup>2</sup>NVEO) is responsible for developing cryogenic coolers for all infrared (IR) imaging systems for the Army. C<sup>2</sup>NVEO also maintains configuration management control of the Forward Looking Infrared (FLIR) Common Module coolers used in thermal imagers in fielded Army weapon systems such as the M60A3 and M1 Tanks, the Bradley Fighting Vehicle System, the TOW Missile System, and the Army Attack Helicopter. There are currently over 30,000 coolers in fielded systems and several thousand more are added each year. C<sup>2</sup>NVEO conducts development programs and monitors contractor internal research and development efforts to improve cooler performance such as reliability, audio noise, power consumption, and output vibration.

The 1-Watt Integral (HD-1033B/C/D) specifications require that the cooler input voltage be 117 +/- 2 volts (V) alternating current (AC) and 400 +/- 20 hertz (Hz). Because of a conflict between the cooler specifications and the aircraft power requirements, it was requested by the Program Manager, Advanced Attack Helicopter, that the C<sup>2</sup>NVEO resolve the differences in the power requirements. Specifically, the lowest input voltage that may be supplied to the cooler from the TADS/PNVIS system is 108 VAC. The purpose of the testing was to evaluate the cooler performance and restart capability when operated at the lower input voltage of 108 VAC at various temperatures. In order to compare test results, all the coolers were also tested at an input voltage of 117 VAC.

## SECTION II. DESCRIPTION

The reduced voltage testing was conducted on six 1-Watt Integral Coolers which were mated to DT-594 detector/dewars. Three of the coolers tested were AEG HD-1033C coolers, two were CTI HD-1033C coolers, and the last unit was a CTI clearance seal unit (HD-1033D). The evaluation consisted of subjecting the cooler/dewar assemblies to low (-54°C), high (+71°C), and room (+24°C) temperature performance and restart testing while the coolers were operated at 108 and 117 VAC. The performance testing consisted of allowing the assemblies to stabilize at the appropriate temperature and then running the units for 20-minutes. During the 20 minute period, a cooldown check was performed and the input power and detector temperature were monitored (Appendix A). The restart testing was comprised of stabilizing the assemblies to the necessary temperature. Once stabilized, the coolers were operated until the detector temperature reached 75K, at which time the power was cut off and then resupplied within 2 seconds. This sequence was repeated an additional four times (Appendix B).

### SECTION III. SUMMARY

The six coolers tested showed negligible or no degradation in performance when operated at 108 VAC over the operating temperature requirements of the military specifications ( $-54^{\circ}\text{C}$  to  $71^{\circ}\text{C}$ ). In all cases, the cooler adequately cooled down the detector in the allotted time, maintained the detector temperature under 80K, and restarted every time power was cut off and then reapplied within 2 seconds. A summary of all the coolers' data is provided in the following table. Appendix A contains all the performance data from the testing and Appendix B contains the restart data. Based on the test results, C<sup>2</sup>NVEO will modify the HD-1033C specification and HD-1033D Purchase Description to be compatible with the TADS/PNVIS system power values.

# Summary of Test Results

Cooler	/ Dewar	Requirement	117 volt 24°C	108 volt 24°C	117 volt -54°C	108 volt -54°C	117 volt +71°C	108 volt +71°C
AEG LV-2528	/ AEG A 2516	● Cooldown (Time) (mins)	10.55	10.72	5.53	5.20	15.45	16.12
		● Detector Temp @ 20 min (K)	56.95	57.19	66.51	43.61*	71.42	73.13
		● Input Power (watts)	53.62	51.07	48.07	45.96	51.06	49.05
		● Restart	Yes	Yes	Yes	Yes	Yes	Yes
AEG LV-1945	/ AEG A 2754	● Cooldown (Time) (mins)	9.00	9.28	4.80	4.97	14.20	14.45
		● Detector Temp @ 20 min (K)	52.28	51.65	21.93*	64.38	71.55	71.00
		● Input Power (watts)	57.74	53.83	43.17	42.44	59.68	57.01
		● Restart	Yes	Yes	Yes	Yes	Yes	Yes
AEG LV-2349	/ AEG A 3047	● Cooldown (Time) (mins)	11.10	10.18	5.70	6.20	14.47	15.12
		● Detector Temp @ 20 min (K)	59.63	59.94	61.06	67.66	71.58	72.57
		● Input Power (watts)	54.22	51.50	63.53	49.58	54.27	51.02
		● Restart	Yes	Yes	Yes	Yes	Yes	Yes

# Summary of Test Results - Continued

Cooler / Dewar	Requirement	117 volt 24°C	108 volt 24°C	117 volt -54°C	108 volt -54°C	117 volt +71°C	108 volt +71°C
CTI CS / SBRC 005 / 1133	<ul style="list-style-type: none"> <li>• Cooldown (Time) (mins)</li> <li>• Detector Temp @ 20 min (°F)</li> <li>• Input Power (watts)</li> <li>• Restart</li> </ul>	8.28 50.86 46.99 Yes	8.45 50.66 42.88 Yes	5.45 73.54 39.95 Yes	4.97 15.60* 36.67 Yes	11.55 66.93 47.45 Yes	11.80 66.48 44.17 Yes
CTI / Honeywell C6983G / NVL001	<ul style="list-style-type: none"> <li>• Cooldown (Time) (mins)</li> <li>• Detector Temp @ 20 min (K)</li> <li>• Input Power (watts)</li> <li>• Restart</li> </ul>	8.12 55.75 51.52 Yes	8.28 55.75 47.14 Yes	2.62 37.93* 42.75 Yes	2.70 64.42 39.96 Yes	11.18 68.87 55.84 Yes	10.63 69.84 54.46 Yes
CTI / TI C6879E / 15138	<ul style="list-style-type: none"> <li>• Cooldown (Time) (mins)</li> <li>• Detector Temp @ 20 min (K)</li> <li>• Input Power (watts)</li> <li>• Restart</li> </ul>	10.13 71.74 51.94 Yes	8.80 70.91 47.92 Yes	4.28 64.88 49.32 Yes	5.20 69.85 44.76 Yes	— 82.27 54.80 Yes	— 82.98 52.21 Yes

- The 2N2222 in the detector/dewar is not calibrated below the 77K point. The voltage/temperature conversion is not reliable once the detector gets below 50K.



**APPENDIX A**  
**PERFORMANCE DATA**

**COOLER/DEWAR**

**AEG      AEG**  
**(LV-2528 / A2516)**

# NVEOL CRYOGENIC COOLER LAB

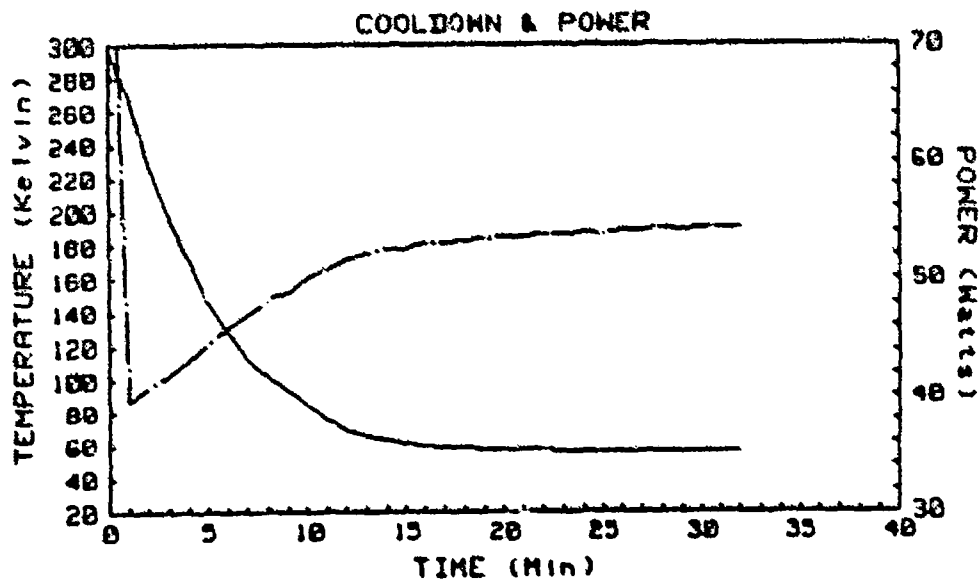
## CRYOGENIC COOLER DATA

COOLER: AEG LV-2528  
VOLTAGE: 117  
AMBIENT: 24

DATE: 4 APR 88 11:08  
ENGR: H. KLING  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 SN AEG-A2516

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	99.68	.829	297.74	0.000
1.00	39.60	.439	268.68	0.000
2.00	40.75	.446	230.18	0.000
3.00	41.78	.452	197.69	0.000
4.00	43.16	.460	169.92	0.000
5.00	44.37	.467	147.06	0.000
6.00	45.94	.477	127.93	0.000
7.00	46.88	.483	113.84	0.000
8.00	48.18	.491	102.07	0.000
8.28	48.49	.494	99.67	0.000
9.00	48.89	.496	93.67	0.000
10.00	50.05	.504	85.15	0.000
10.55	50.68	.507	80.06	0.000
11.00	50.78	.510	75.95	0.000
12.00	51.63	.515	69.45	0.000
13.00	52.13	.518	65.29	0.000
14.00	52.59	.520	62.65	0.000
15.00	52.62	.522	60.81	0.000
16.00	53.00	.526	59.52	0.000
17.00	53.07	.526	58.54	0.000
18.00	53.31	.526	57.87	0.000
19.00	53.45	.527	57.32	0.000
20.00	53.62	.530	56.95	0.000
30.00	54.30	.535	56.15	.000



# NVEOL CRYOGENIC COOLER LAB

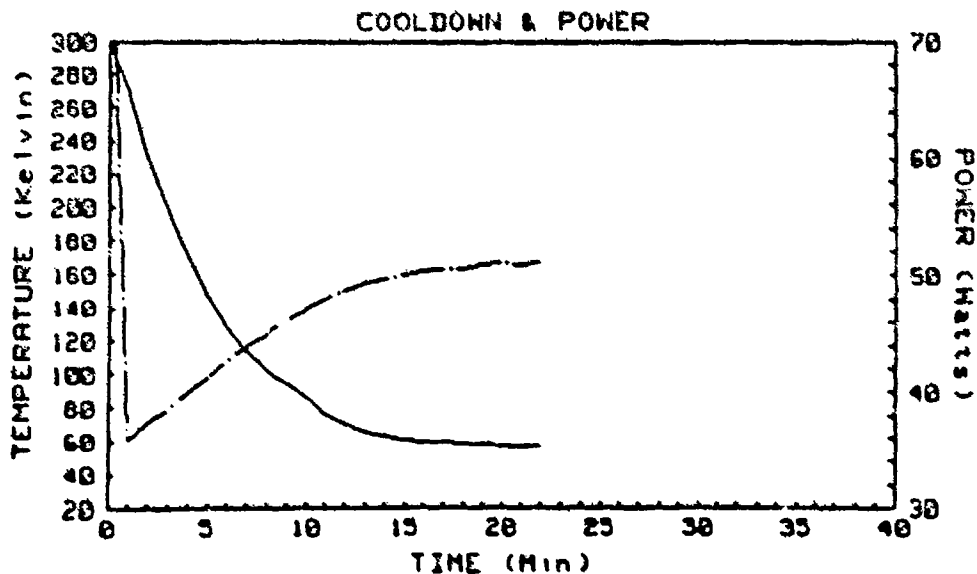
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COOLER: AEG AEG LV-2528  
VOLTAGE: 108  
AMBIENT: 24

DATE: 4 APR 88 14:37  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 SN AE6-2516

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	87.94	.794	298.59	0.000
1.00	35.78	.415	269.84	0.000
2.00	37.20	.425	231.41	0.000
3.00	38.50	.433	199.16	0.000
4.00	39.82	.443	171.52	0.000
5.00	41.05	.451	148.71	0.000
6.00	42.45	.462	129.59	0.000
7.00	43.73	.471	114.63	0.000
8.00	44.79	.481	102.98	0.000
8.37	45.38	.485	99.88	0.000
9.00	46.04	.490	94.71	0.000
10.00	47.15	.499	86.62	0.000
10.72	47.86	.502	79.94	0.000
11.00	48.04	.506	77.38	0.000
12.00	48.72	.510	70.50	0.000
13.00	49.36	.517	65.86	0.000
14.00	49.81	.522	63.14	0.000
15.00	50.00	.523	61.30	0.000
16.00	50.44	.524	59.89	0.000
17.00	50.54	.525	58.91	0.000
18.00	50.67	.526	58.17	0.000
19.00	50.91	.527	57.62	0.000
20.00	51.07	.531	57.19	0.000



# NVEOL CRYOGENIC COOLER LAB

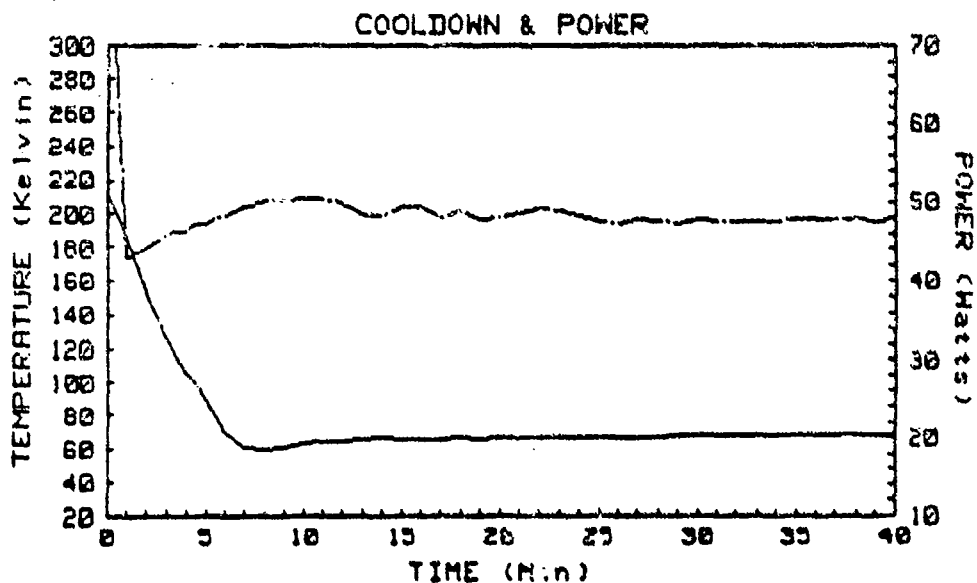
## CRYOGENIC COOLER DATA

COOLER: AEG LV-2526  
VOLTAGE: 117  
AMBIENT: -54

DATE: 7-APR-68 17:54  
ENGR: H KLING  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 AEG SN.A2516

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	85.13	.001	212.06	0.000
1.00	43.03	.482	186.24	0.000
2.00	44.16	.494	152.92	0.000
3.00	46.06	.510	126.10	0.000
4.00	46.47	.513	105.57	0.000
4.37	47.21	.517	99.89	0.000
5.00	47.22	.525	88.95	0.000
5.53	48.11	.528	78.97	0.000
6.00	48.31	.531	70.66	0.000
7.00	49.30	.538	61.14	0.000
8.00	50.09	.543	59.85	0.000
9.00	50.28	.548	61.15	0.000
10.00	50.31	.545	62.91	0.000
11.00	50.32	.545	64.12	0.000
12.00	49.94	.541	65.00	0.000
13.00	48.28	.531	65.59	0.000
14.00	48.31	.528	67.10	0.000
15.00	49.39	.540	66.22	0.000
16.00	49.37	.537	65.86	0.000
17.00	47.96	.527	66.18	0.000
18.00	46.81	.532	66.43	0.000
19.00	47.75	.521	66.07	0.000
20.00	46.87	.523	66.51	0.000
30.00	47.72	.520	67.66	.993
40.00	47.68	.519	67.95	2.537



## NVEOL CRYOGENIC COOLER LAB

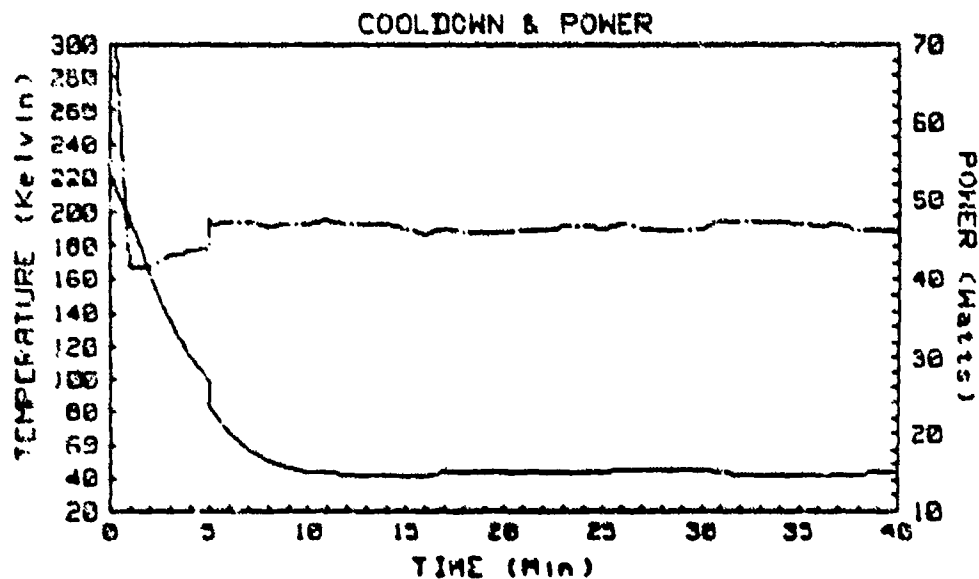
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COOLER: AEG LV-2528  
 VOLTAGE: 108  
 AMBIENT: -54

DATE: 7-APR-88 16:19  
 ENGR: H KLING  
 VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 AEG SN.A2516

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	81.01	.001	222.43	0.000
1.00	41.58	.477	196.87	0.000
2.00	41.42	.479	163.05	0.000
3.00	42.92	.489	135.71	0.000
4.00	43.51	.496	114.29	0.000
4.97	43.94	.506	98.51	0.000
5.00	47.82	.541	83.34	0.000
5.20	46.99	.536	80.09	0.000
6.00	47.22	.534	66.66	0.000
7.00	47.15	.539	57.03	0.000
8.00	46.84	.534	50.93	0.000
9.00	47.04	.536	46.51	0.000
10.00	47.05	.537	43.99	0.000
11.00	47.64	.531	43.03	0.000
12.00	46.90	.530	42.71	0.000
13.00	47.12	.536	42.25	0.000
14.00	46.97	.533	41.81	0.000
15.00	46.41	.525	41.53	0.000
16.00	45.66	.527	41.38	0.000
17.00	46.59	.527	42.94	0.000
18.00	45.94	.525	43.35	0.000
19.00	46.06	.521	43.53	0.000
20.00	45.96	.520	43.61	0.000
30.00	46.54	.528	44.20	2.467
40.00	46.20	.527	43.72	.376



## NVEOL CRYOGENIC COOLER LAB

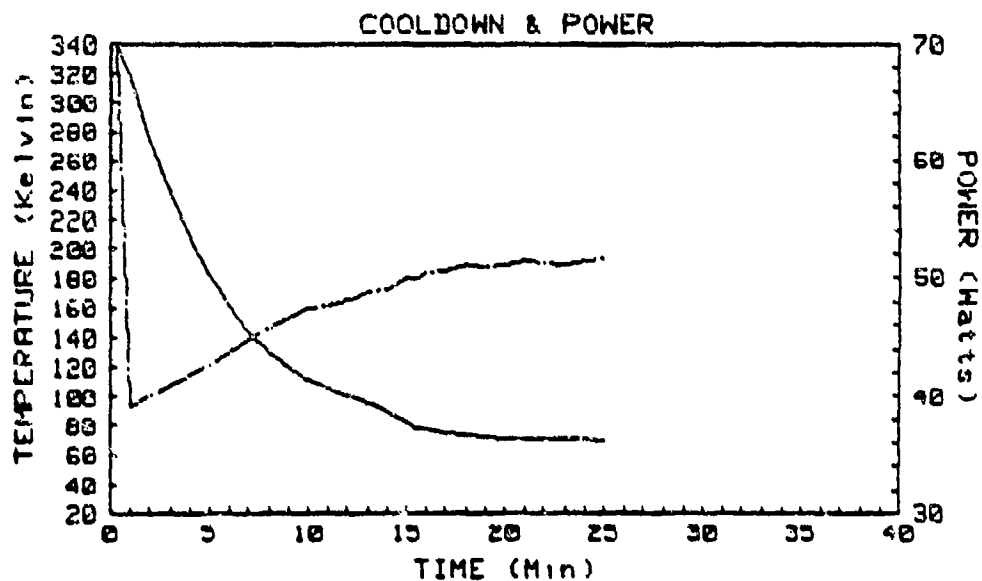
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COOLER: AEG LV-2528  
VOLTAGE: 117  
AMBIENT: 71

DATE: 15-APR-88 19:00  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 AEG SN A2516

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	85.45	.822	348.31	0.000
1.00	39.18	.439	317.29	0.000
2.00	40.07	.445	274.56	0.000
3.00	40.93	.451	238.27	0.000
4.00	41.85	.458	207.26	0.000
5.00	42.70	.465	182.18	0.000
6.00	43.67	.474	160.79	0.000
7.00	44.85	.481	143.81	0.000
8.00	45.83	.490	130.08	0.000
9.00	46.53	.496	119.60	0.000
10.00	47.39	.502	111.51	0.000
11.00	47.69	.505	105.50	0.000
12.00	48.07	.510	100.72	0.000
12.20	48.16	.511	100.04	0.000
13.00	48.89	.515	95.81	0.000
14.00	49.11	.520	88.64	0.000
15.00	50.10	.528	81.96	0.000
15.45	50.09	.526	79.69	0.000
16.00	50.44	.529	77.42	0.000
17.00	50.54	.530	74.85	0.000
18.00	51.11	.536	73.38	0.000
19.00	50.95	.534	72.33	0.000
20.00	51.08	.537	71.42	0.000



# NVEOL CRYOGENIC COOLER LAB

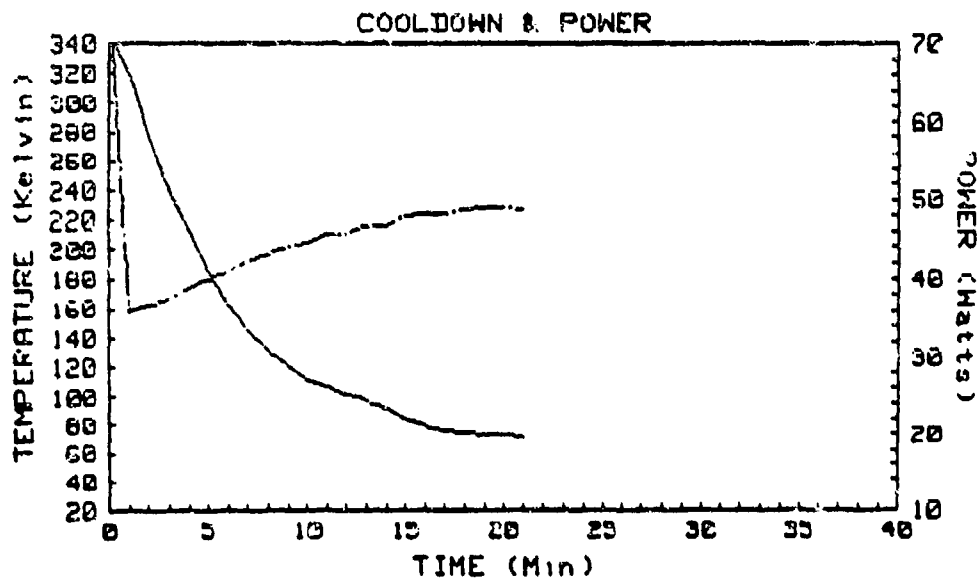
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COOLER: AEG LV-2528  
VOLTAGE: 100  
AMBIENT: 71

DATE: 15-APR-86 14:47  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 SN AEG-A2516

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	77.73	.805	351.13	0.000
1.00	35.92	.411	319.86	0.000
2.00	36.70	.419	277.51	0.000
3.00	37.58	.426	241.95	0.000
4.00	30.84	.438	211.30	0.000
5.00	40.01	.449	185.99	0.000
6.00	41.05	.458	164.41	0.000
7.00	42.28	.469	147.06	0.000
8.00	43.43	.481	132.90	0.000
9.00	44.02	.487	122.11	0.000
10.00	44.68	.494	113.59	0.000
11.00	45.60	.501	107.28	0.000
12.00	45.71	.504	102.31	0.000
12.63	46.38	.511	99.92	0.000
13.00	46.62	.512	97.20	0.000
14.00	46.78	.515	92.01	0.000
15.00	47.96	.526	85.51	0.000
16.00	48.25	.531	80.06	0.000
16.12	48.35	.531	73.67	0.000
17.00	48.24	.530	76.81	0.000
18.00	48.75	.536	74.91	0.000
19.00	49.09	.540	73.81	0.000
20.00	49.05	.538	73.13	0.000





**COOLER/DEWAR**

**AEG / AEG  
(LV-1945 / A2754)**

# NVEOL CRYOGENIC COOLER LAB

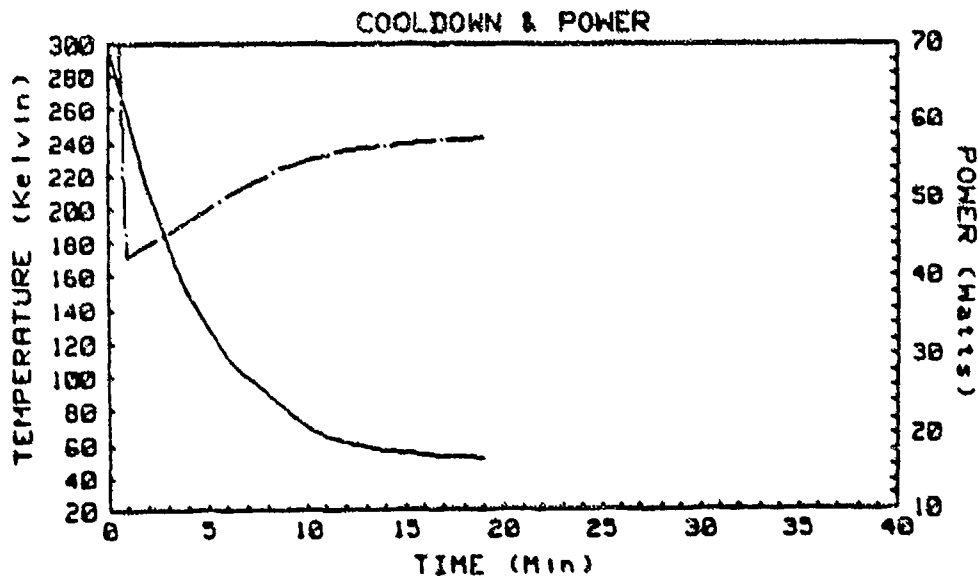
## CRYOGENIC COOLER DATA

COOLER: AEG LV1945  
VOLTAGE: 117  
AMBIENT: 23

DATE: 5 APR 88 13:56  
ENGR: H. KLING  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 AEG SN A2754

TIME	POWER	CURRENT	KELVIN	LOAD
0.00				
103.58 20.20	.858	295.95	0.000	
1.00	42.52	.451	258.02	0.000
2.00	43.98	.461	213.69	0.000
3.00	45.41	.471	178.99	0.000
4.00	47.01	.482	151.05	0.000
5.00	48.59	.493	129.39	0.000
6.00	50.19	.503	112.75	0.000
7.00	51.57	.513	100.64	0.000
7.10	51.69	.515	99.77	0.000
8.00	52.83	.521	90.83	0.000
9.00	54.06	.529	79.85	0.000
9.10	54.02	.532	78.98	0.000
10.00	54.85	.536	71.03	0.000
11.00	55.59	.542	65.69	0.000
12.00	56.28	.546	62.15	0.000
13.00	56.53	.551	59.30	0.000
14.00	56.85	.551	57.12	0.000
15.00	57.18	.553	55.45	0.000
16.00	57.35	.556	54.27	0.000
17.00	57.54	.557	53.52	0.000
18.00	57.56	.557	52.72	0.000



# NVEOL CRYOGENIC COOLER LAB

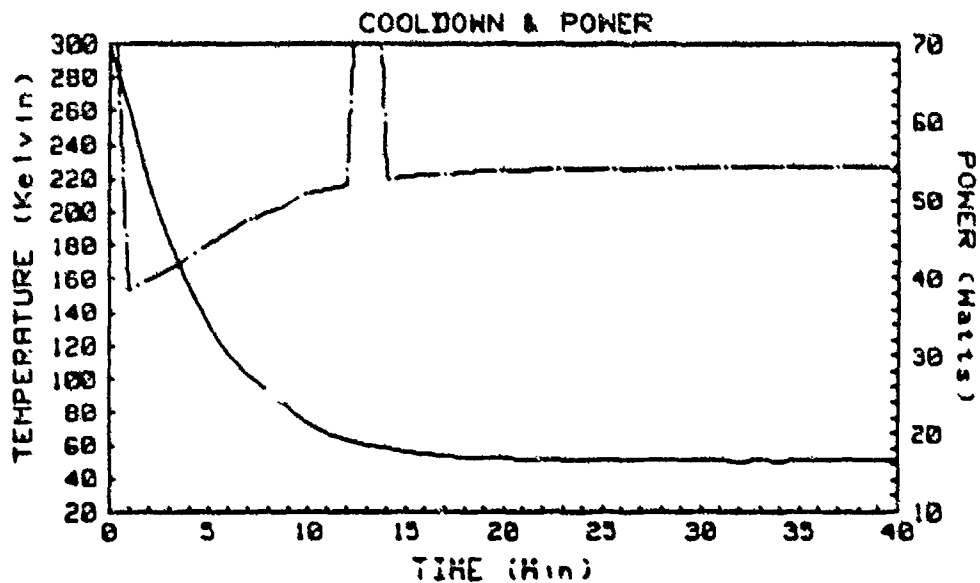
## CRYOGENIC COOLER DATA

COOLER: AEG LV-1945  
VOLTAGE: 108  
AMBIENT: 24

DATE: 5 APR 88 18:18  
ENGR: H KLING  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 AEG SN. A2754

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	92.23	.834	298.98	0.000
1.00	38.43	.431	261.28	0.000
2.00	39.88	.440	217.22	0.000
3.00	41.25	.450	182.55	0.000
4.00	42.78	.463	154.43	0.000
5.00	44.35	.474	132.36	0.000
6.00	45.93	.489	115.31	0.000
7.00	47.46	.498	102.58	0.000
7.28	47.66	.501	99.86	0.000
8.00	48.55	.508	93.00	0.000
9.00	49.69	.521	82.49	0.000
9.28	50.09	.523	79.77	0.000
10.00	50.85	.527	72.91	0.000
11.00	51.45	.536	66.67	0.000
12.00	52.13	.538	62.59	0.000
13.00				
128.9	20.20			
	.542	59.81	0.000	
14.00	52.72	.544	57.65	0.000
15.00	53.02	.549	55.79	0.000
16.00	53.32	.547	54.25	0.000
17.00	53.42	.552	53.07	0.000
18.00	53.69	.552	52.21	0.000
19.00	53.85	.554	51.59	0.000
20.00	53.83	.555	51.65	0.000
30.00	54.45	.561	50.23	.000
40.00	54.48	.561	50.29	.000



# NVEOL CRYOGENIC COOLER LAB

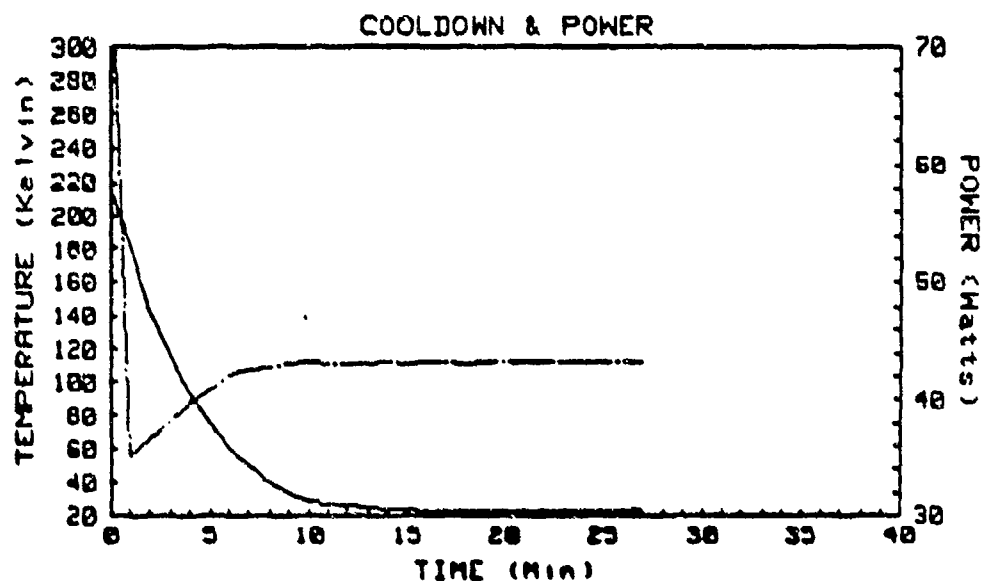
## CRYOGENIC COOLER DATA

COOLER: AEG LV-1945  
VOLTAGE: 117  
AMBIENT: -54

DATE: 11 APR 88 15:52  
ENGR: H KLING  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 AEG SN-A2754

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	79.33	.779	214.87	0.000
1.00	35.11	.413	182.48	0.000
2.00	36.60	.422	144.42	0.000
3.00	38.17	.435	115.31	0.000
3.70	39.21	.448	99.67	0.000
4.00	39.67	.448	93.62	0.000
4.80	40.62	.456	79.15	0.000
5.00	40.78	.457	75.20	0.000
6.00	41.92	.466	60.18	0.000
7.00	42.52	.473	50.66	0.000
8.00	42.76	.474	40.34	0.000
9.00	43.02	.480	33.05	0.000
10.00	43.14	.480	29.16	0.000
11.00	43.12	.479	27.30	0.000
12.00	43.11	.480	25.57	0.000
13.00	43.05	.480	24.34	0.000
14.00	43.16	.478	23.84	0.000
15.00	43.12	.477	23.60	0.000
16.00	43.17	.479	22.92	0.000
17.00	43.18	.479	22.42	0.000
18.00	43.08	.477	22.17	0.000
19.00	43.14	.480	21.99	0.000
20.00	43.17	.480	21.93	0.000



# NVEOL CRYOGENIC COOLER LAB

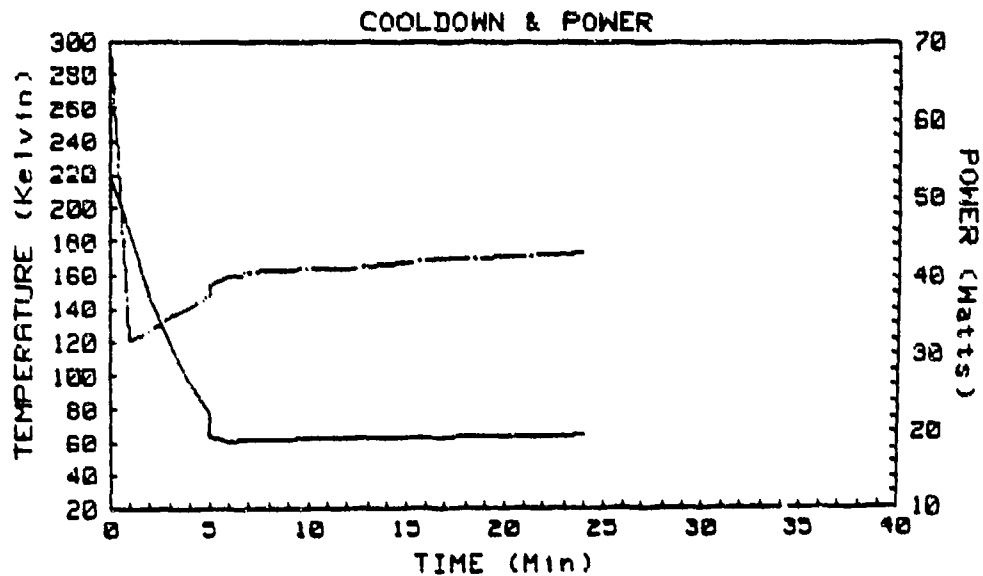
## CRYOGENIC COOLER DATA

COOLER: AEG LV-1945  
VOLTAGE: 108  
AMBIENT: -54

DATE: 12-APR-88 19:24  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 AEG SN/A2754

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	72.10	.001	218.20	0.000
1.00	31.78	.383	186.32	0.000
2.00	32.84	.392	148.49	0.000
3.00	34.51	.406	118.71	0.000
3.88	35.82	.418	99.49	0.000
4.00	35.98	.423	96.64	0.000
4.97	37.49	.435	78.29	0.000
5.00	38.85	.448	64.32	0.000
6.00	39.80	.455	61.05	0.000
7.00	40.37	.461	61.42	0.000
8.00	40.58	.468	62.04	0.000
9.00	40.74	.466	62.47	0.000
10.00	40.83	.467	62.65	0.000
11.00	40.87	.469	62.84	0.000
12.00	41.05	.469	62.96	0.000
13.00	41.22	.473	63.09	0.000
14.00	41.51	.475	63.15	0.000
15.00	41.66	.478	63.27	0.000
16.00	41.89	.479	63.46	0.000
17.00	42.13	.478	63.70	0.000
18.00	42.28	.482	63.95	0.000
19.00	42.37	.481	64.20	0.000
20.00	42.44	.483	64.38	0.000



# NVEOL CRYOGENIC COOLER LAB

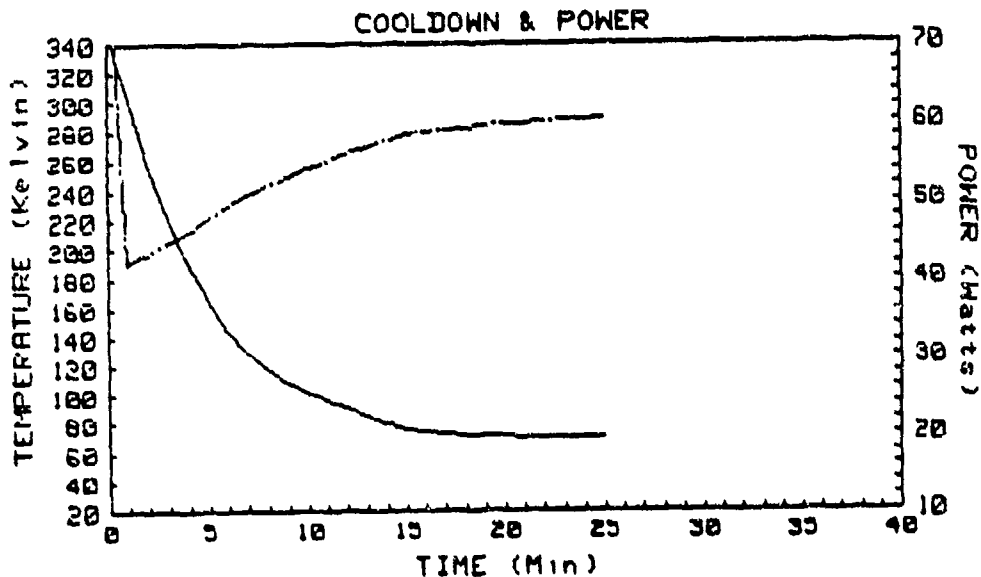
## CRYOGENIC COOLER DATA

COOLER: AEG LV-1945  
VOLTAGE: 117  
AMBIENT: 71

DATE: 18-APR-88 12:26  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 AEG SN A3047

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	90.43	.876	348.29	0.000
1.00	41.94	.459	307.44	0.000
2.00	43.19	.466	259.86	0.000
3.00	44.62	.479	222.22	0.000
4.00	45.87	.492	191.07	0.000
5.00	47.70	.507	166.48	0.000
6.00	49.29	.518	146.08	0.000
7.00	50.67	.533	130.51	0.000
8.00	52.07	.545	118.21	0.000
9.00	53.21	.557	109.13	0.000
10.00	54.14	.563	102.14	0.000
10.45	54.47	.568	99.80	0.000
11.00	55.04	.572	96.95	0.000
12.00	55.92	.581	91.82	0.000
13.00	56.72	.589	86.14	0.000
14.00	57.46	.598	80.70	0.000
14.20	57.63	.598	79.96	0.000
15.00	58.34	.607	76.87	0.000
16.00	58.61	.609	74.83	0.000
17.00	58.89	.612	73.59	0.000
18.00	59.19	.615	72.66	0.000
19.00	59.44	.616	72.11	0.000
20.00	59.68	.620	71.55	0.000



## NVEOL CRYOGENIC COOLER LAB

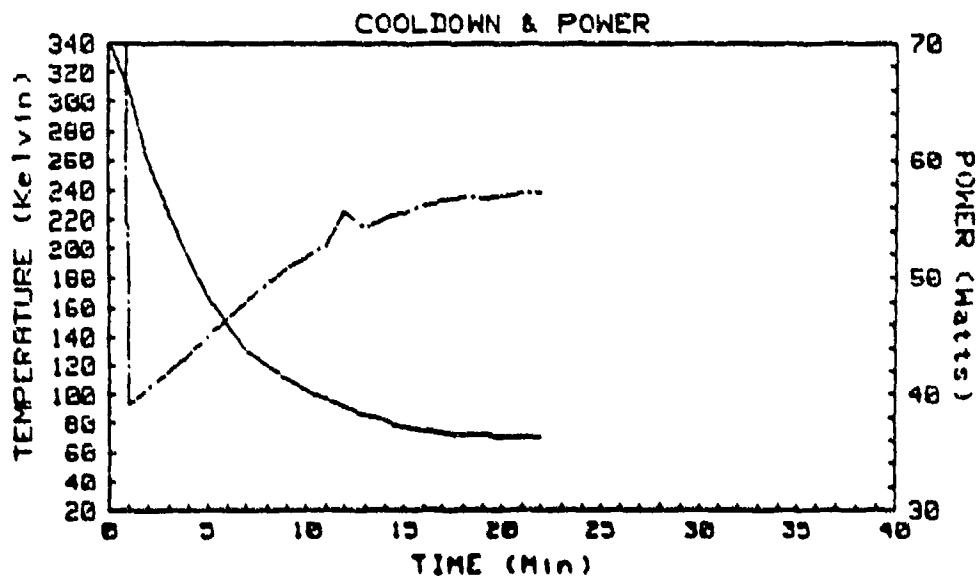
## CRYOGENIC COOLER DATA

COOLER: AEG LV-1945  
VOLTAGE: 108  
AMBIENT: 71

DATE: 14-APR-88 11:41  
ENGR: L HOYLE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 AEG SN/A2754

TIME	POWER	CURRENT	KELVIN	LOAD
0.00				
438.4 20.20				
.001	345.70	0.000		
1.00	39.09	.439	308.62	0.000
2.00	40.40	.457	262.08	0.000
3.00	42.00	.466	224.63	0.000
4.00	43.48	.480	193.18	0.000
5.00	45.06	.496	168.27	0.000
6.00	46.65	.515	147.94	0.000
7.00	48.06	.529	131.68	0.000
8.00	49.49	.545	119.39	0.000
9.00	50.80	.557	109.93	0.000
10.00	51.76	.569	102.95	0.000
10.53	52.41	.577	99.92	0.000
11.00	52.74	.582	97.39	0.000
12.00	55.71	.591	92.38	0.000
13.00	54.34	.598	86.69	0.000
14.00	55.08	.608	81.50	0.000
14.45	55.35	.610	79.77	0.000
15.00	55.59	.613	77.61	0.000
16.00	56.18	.619	75.08	0.000
17.00	56.54	.623	73.53	0.000
18.00	56.98	.627	72.36	0.000
19.00	56.72	.626	71.61	0.000
20.00	57.01	.627	71.00	0.000



# NVEOL CRYOGENIC COOLER LAB

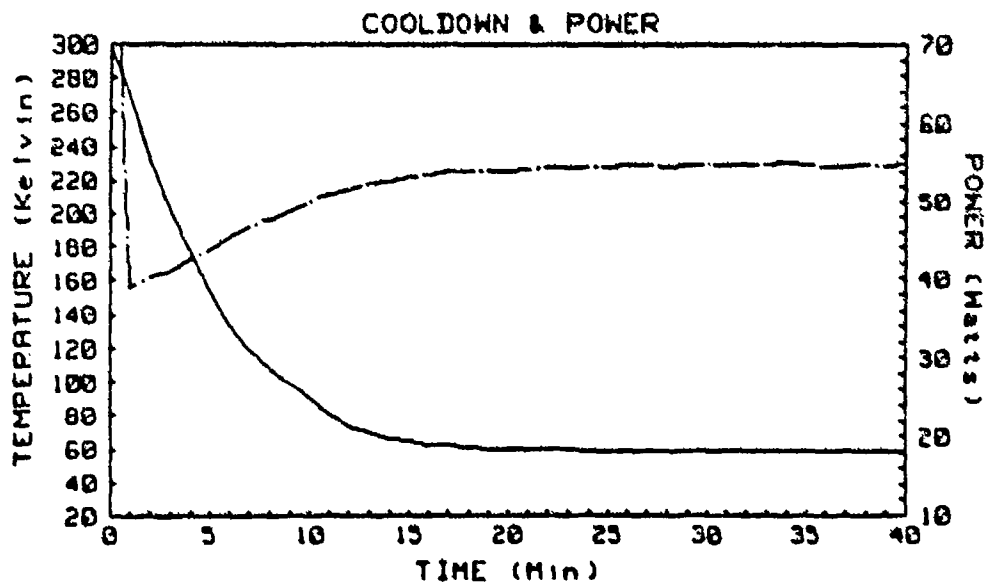
## CRYOGENIC COOLER DATA

COOLER: AEG LV2349  
VOLTAGE: 117  
AMBIENT: 24

DATE: 4 APR 88 13:20  
ENGR: H. KLING  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 SN AEG A3047

TIME	POWER	CURRENT	KELVIN	LOAD
0.00				
101.67 2D.2D				
	.079	297.00	0.000	
1.00	39.14	.436	270.81	0.000
2.00	40.40	.444	233.68	0.000
3.00	41.31	.448	202.08	0.000
4.00	42.81	.457	175.08	0.000
5.00	43.87	.465	152.75	0.000
6.00	45.42	.475	133.78	0.000
7.00	46.83	.483	118.85	0.000
8.00	47.73	.488	107.03	0.000
8.80	48.65	.495	100.07	0.000
9.00	48.83	.496	98.39	0.000
10.00	49.95	.504	90.55	0.000
11.00	51.26	.514	80.72	0.000
11.10	51.33	.513	79.97	0.000
12.00	51.79	.517	73.44	0.000
13.00	52.44	.521	68.78	0.000
14.00	52.93	.525	65.85	0.000
15.00	53.31	.528	63.86	0.000
16.00	53.61	.530	62.43	0.000
17.00	54.08	.534	61.38	0.000
18.00	54.11	.534	60.63	0.000
19.00	54.21	.533	60.07	0.000
20.00	54.22	.534	59.63	0.000
30.00	54.82	.540	58.39	.000
40.00	55.02	.539	58.27	.000





# NVEOL CRYOGENIC COOLER LAB

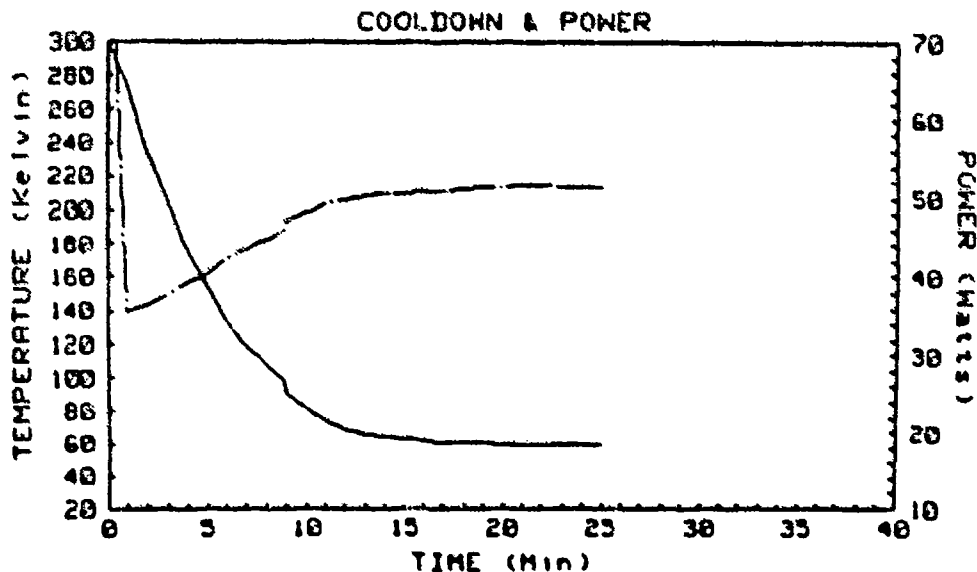
## CRYOGENIC COOLER DATA

COOLER: AEG AEG LV-2349  
VOLTAGE: 108  
AMBIENT: 24

DATE: 4 APR 88 15:59  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HQ-1033/DT594 SN A3047

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	91.00	.001	299.80	0.000
1.00	35.65	.413	273.54	0.000
2.00	36.50	.420	236.34	0.000
3.00	37.85	.428	204.42	0.000
4.00	39.46	.441	176.98	0.000
5.00	40.51	.448	154.58	0.000
6.00	42.39	.460	135.23	0.000
7.00	43.55	.471	119.86	0.000
8.00	44.80	.481	107.60	0.000
8.97	46.03	.492	99.33	0.000
9.00	47.36	.500	91.11	0.000
10.00	48.27	.510	81.41	0.000
10.18	48.43	.511	79.91	0.000
11.00	49.33	.517	74.00	0.000
12.00	49.79	.521	69.21	0.000
13.00	50.34	.527	66.22	0.000
14.00	50.68	.528	64.23	0.000
15.00	50.76	.529	62.80	0.000
16.00	50.93	.530	61.74	0.000
17.00	50.98	.531	61.00	0.000
18.00	51.30	.535	60.44	0.000
19.00	51.52	.536	60.13	0.000
20.00	51.50	.535	59.94	0.000



**COOLER/DEWAR**

**AEG / AEG**  
**(LV-2349 / A3047)**

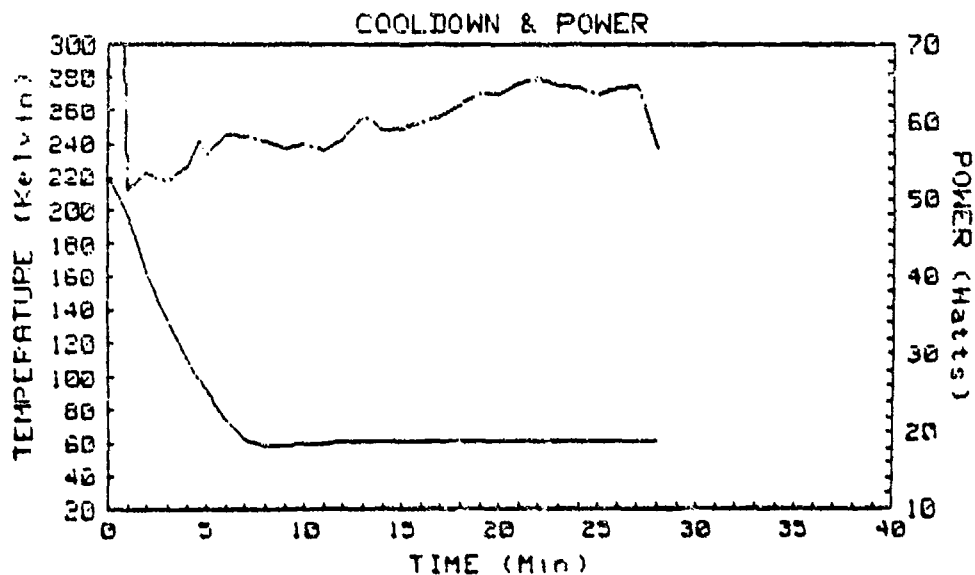
## CRYOGENIC COOLER DATA

COOLER: AEG LV-2349  
 VOLTAGE: 117  
 AMBIENT: -54

DATE: 6-APR-88 16:37  
 ENGR: L HOYLE  
 VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 SN A3047

TIME	POWER	CURRENT	KELVIN	LOAD
0.00				
154.73 20.20				
1.580	222.40	0.000		
1.00	51.36	.527	197.88	0.000
2.00	53.38	.534	162.67	0.000
3.00	52.25	.539	133.17	0.000
4.00	54.19	.552	110.03	0.000
4.63	57.56	.557	96.77	0.000
5.00	55.63	.563	92.23	0.000
5.70	57.56	.577	79.79	0.000
6.00	56.24	.575	74.38	0.000
7.00	58.22	.585	62.55	0.000
8.00	57.48	.572	58.57	0.000
9.00	56.53	.565	58.82	0.000
10.00	57.08	.567	59.26	0.000
11.00	56.26	.571	59.82	0.000
12.00	57.71	.579	60.31	0.000
13.00	60.63	.596	60.62	0.000
14.00	58.35	.579	60.75	0.000
15.00	56.24	.564	60.81	0.000
16.00	59.63	.589	60.87	0.000
17.00	60.75	.594	60.94	0.000
18.00	62.45	.606	60.94	0.000
19.00	63.56	.621	61.00	0.000
20.00	63.53	.613	61.06	0.000



# NEOL CRYOGENIC COOLER LAB

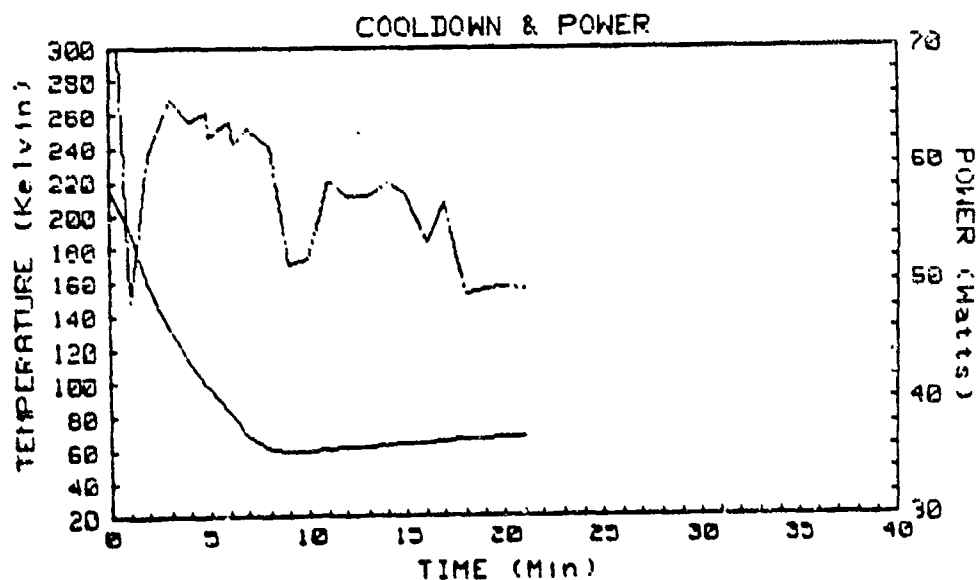
## CRYOGENIC COOLER DATA

COOLER: AEG LV-2349  
VOLTAGE: 106  
AMBIENT: -54

DATE: 12-APR-88 15:09  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT-594 AEG SN/A3047

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	63.46	.900	215.66	0.000
1.00	46.33	.537	191.16	0.000
2.00	60.91	.716	156.56	0.000
3.00	65.67	.754	132.86	0.000
4.00	63.59	.731	112.64	0.000
4.88	64.53	.735	99.39	0.000
5.00	62.40	.732	97.52	0.000
6.00	63.64	.714	82.53	0.000
6.20	61.66	.719	79.85	0.000
7.00	63.13	.723	69.09	0.000
8.00	61.62	.697	60.81	0.000
9.00	51.44	.586	59.13	0.000
10.00	52.09	.596	59.69	0.000
11.00	58.70	.670	60.56	0.000
12.00	57.40	.658	61.56	0.000
13.00	57.24	.656	62.55	0.000
14.00	58.37	.680	63.49	0.000
15.00	57.53	.651	64.11	0.000
16.00	53.42	.628	64.61	0.000
17.00	56.79	.647	66.10	0.000
18.00	49.09	.552	67.10	0.000
19.00	49.32	.554	67.47	0.000
20.00	49.58	.563	67.66	0.000



# NVEOL CRYOGENIC COOLER LAB

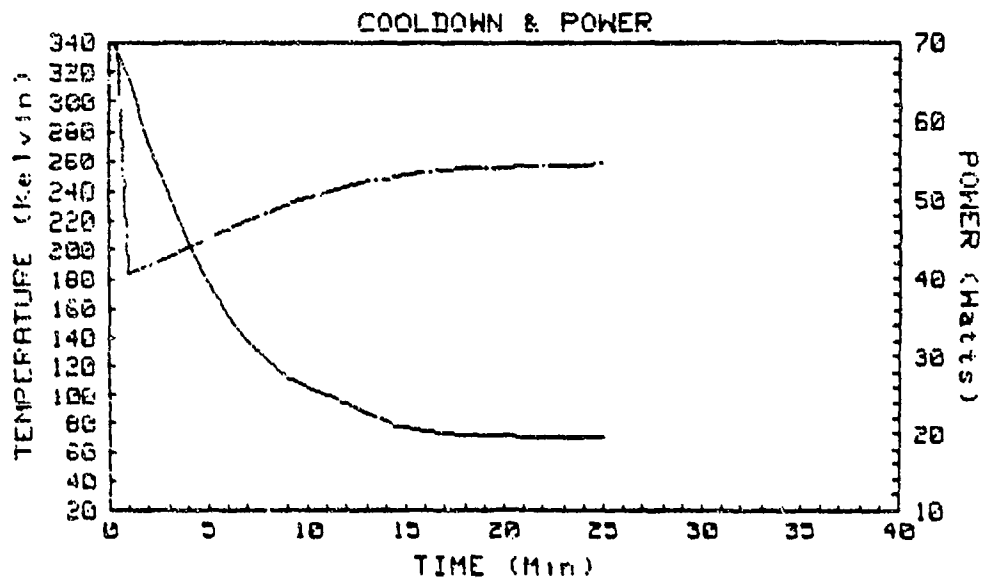
## CRYOGENIC COOLER DATA

COOLER: AEG LV-2349  
VOLTAGE: 117  
AMBIENT: 71

DATE: 16-APR-68 13:00  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 AEG SN A3047

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	69.06	.659	347.77	0.000
1.00	40.79	.452	317.64	0.000
2.00	41.66	.456	274.10	0.000
3.00	42.70	.469	236.52	0.000
4.00	44.17	.480	204.29	0.000
5.00	45.28	.489	177.97	0.000
6.00	46.41	.496	155.70	0.000
7.00	47.56	.506	137.96	0.000
8.00	48.66	.518	123.90	0.000
9.00	49.73	.525	113.39	0.000
10.00	50.51	.533	105.36	0.000
11.00	51.10	.541	100.20	0.000
11.10	51.25	.541	99.62	0.000
12.00	51.61	.546	94.29	0.000
13.00	52.52	.551	87.26	0.000
14.00	52.93	.558	81.66	0.000
14.47	53.16	.560	79.65	0.000
15.00	53.30	.561	78.05	0.000
16.00	53.61	.564	75.62	0.000
17.00	53.65	.566	73.86	0.000
18.00	54.09	.568	72.76	0.000
19.00	54.23	.568	72.07	0.000
20.00	54.27	.571	71.58	0.000



## NVEOL CRYOGENIC COOLER LAB

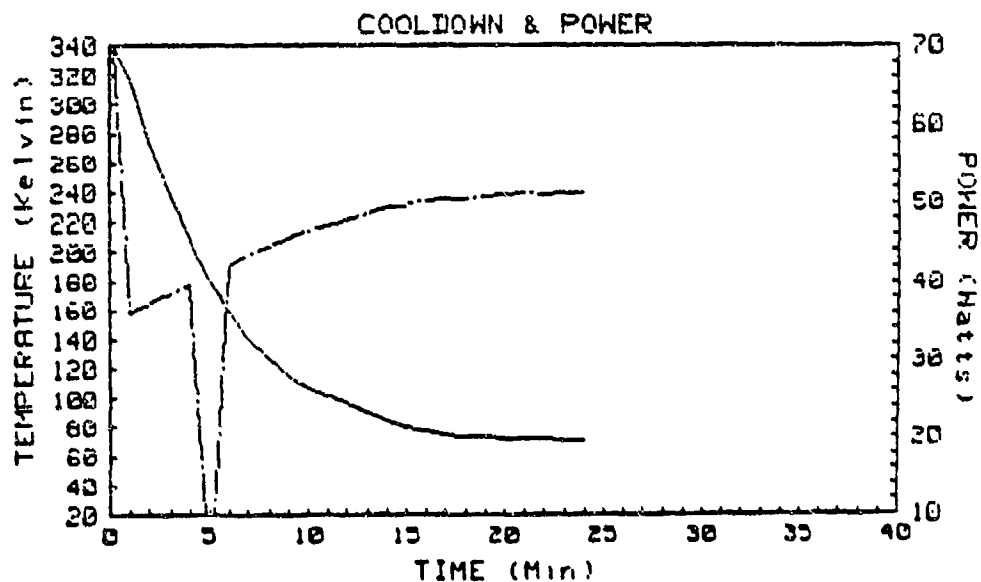
## CRYOGENIC COOLER DATA

COOLER: AEG LV-2349  
VOLTAGE: 106  
AMBIENT: 71

DATE: 14-APR-88 13:58  
ENGR: L HOYLE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST ND-1033/DT594 AEG SN A3047

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	79.78	.001	346.47	0.000
1.00	35.88	.413	317.10	0.000
2.00	37.07	.424	274.85	0.000
3.00	38.55	.438	238.64	0.000
4.00	39.61	.446	207.84	0.000
5.00	3.40	.456	181.52	0.000
6.00	41.97	.469	159.67	0.000
7.00	43.22	.461	141.64	0.000
8.00	44.45	.495	127.51	0.000
9.00	45.49	.505	116.31	0.000
10.00	46.40	.512	107.91	0.000
11.00	47.06	.523	101.75	0.000
11.37	47.39	.523	100.01	0.000
12.00	47.91	.530	97.15	0.000
13.00	46.71	.538	90.74	0.000
14.00	49.34	.546	84.77	0.000
15.00	49.77	.550	80.22	0.000
15.12	49.81	.550	79.91	0.000
16.00	50.11	.553	77.42	0.000
17.00	50.51	.556	75.56	0.000
18.00	50.56	.560	74.25	0.000
19.00	50.80	.562	73.26	0.000
20.00	51.02	.565	72.57	0.000



**COOLER/DEWAR**

**CTI CS / SBRC**  
**(005 / 1133)**

# NVEOL CRYOGENIC COOLER LAB

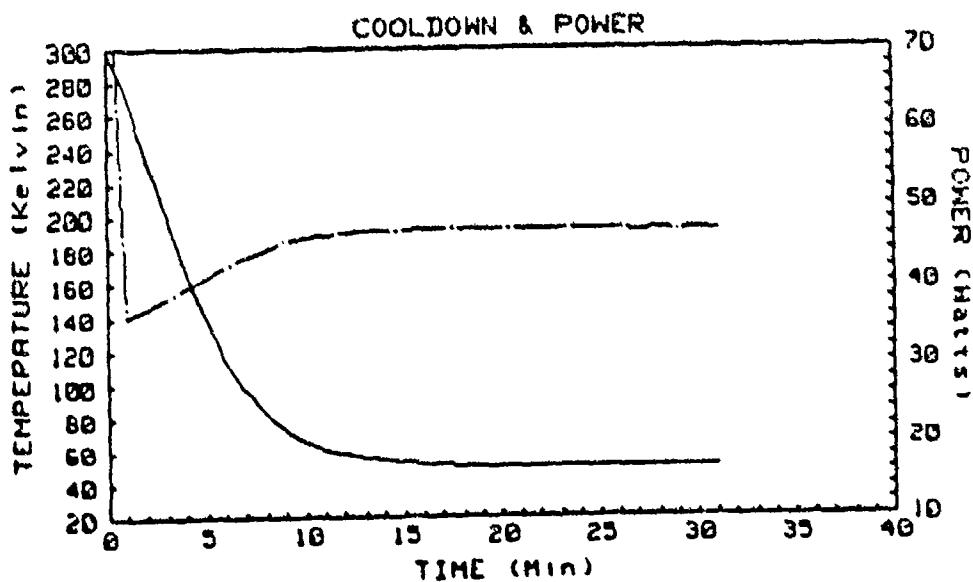
## CRYOGENIC COOLER DATA

COOLER: CTI 005  
VOLTAGE: 117  
AMBIENT: 24

DATE: 4 APR 88 14:08  
ENGR: H KLING  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/D DT-594 SBRC SN-1133

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	93.86	.775	297.13	0.000
1.00	35.93	.428	273.54	0.000
2.00	37.03	.434	235.76	0.000
3.00	38.29	.440	199.72	0.000
4.00	39.69	.448	166.74	0.000
5.00	40.99	.456	138.80	0.000
6.00	42.27	.463	115.28	0.000
6.88	43.23	.469	99.33	0.000
7.00	43.36	.470	97.33	0.000
8.00	44.38	.476	83.20	0.000
8.28	44.72	.477	80.09	0.000
9.00	45.34	.482	72.57	0.000
10.00	45.90	.486	65.70	0.000
11.00	46.29	.487	61.03	0.000
12.00	46.51	.489	57.79	0.000
13.00	46.72	.490	55.65	0.000
14.00	46.79	.491	54.10	0.000
15.00	46.84	.491	53.00	0.000
16.00	46.88	.491	52.22	0.000
17.00	46.98	.492	51.70	0.000
18.00	46.98	.492	51.31	0.000
19.00	46.99	.492	51.05	0.000
20.00	46.99	.492	50.86	0.000
30.00	46.91	.491	50.60	.000





## NVEOL CRYOGENIC COOLER LAB

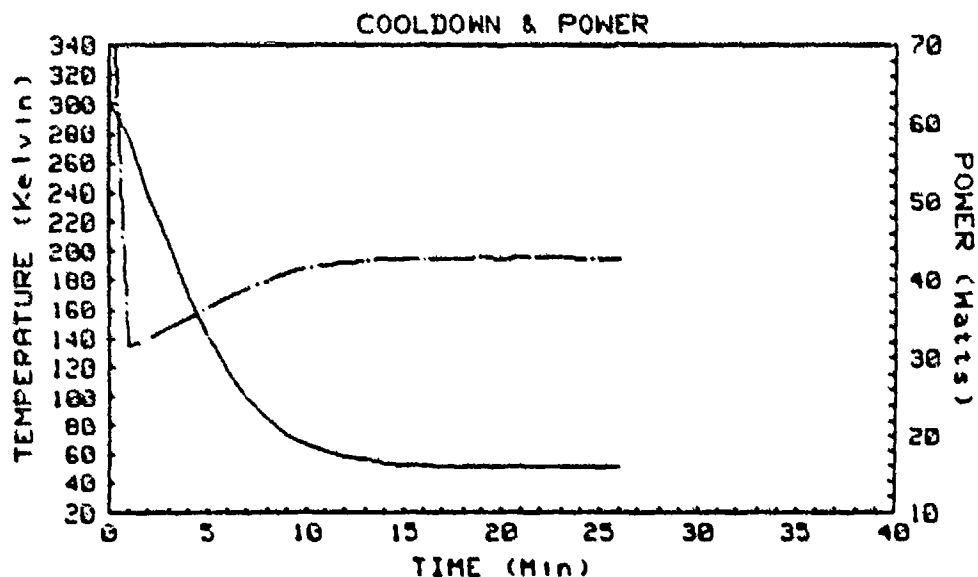
## CRYOGENIC COOLER DATA

COOLER: CTI CTI 005  
VOLTAGE: 108  
AMBIENT: 24

DATE: 5 APR 88 16:39  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/D DT-594 SBRC SN-1133

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	82.69	.001	302.31	0.000
1.00	31.47	.395	278.46	0.000
2.00	32.54	.401	240.49	0.000
3.00	33.73	.409	204.39	0.000
4.00	35.05	.418	171.14	0.000
5.00	36.49	.427	142.69	0.000
6.00	37.85	.436	118.52	0.000
7.00	38.92	.444	99.92	0.000
7.10	38.99	.444	98.56	0.000
8.00	39.94	.451	85.40	0.000
8.45	40.44	.455	80.09	0.000
9.00	40.92	.458	74.25	0.000
10.00	41.65	.464	66.74	0.000
11.00	42.06	.467	61.88	0.000
12.00	42.34	.469	58.44	0.000
13.00	42.60	.470	56.11	0.000
14.00	42.70	.471	54.36	0.000
15.00	42.71	.472	53.13	0.000
16.00	42.87	.472	52.28	0.000
17.00	42.86	.473	51.64	0.000
18.00	42.84	.472	51.18	0.000
19.00	42.94	.472	50.92	0.000
20.00	42.88	.473	50.66	0.000



# NVEOL CRYOGENIC COOLER LAB

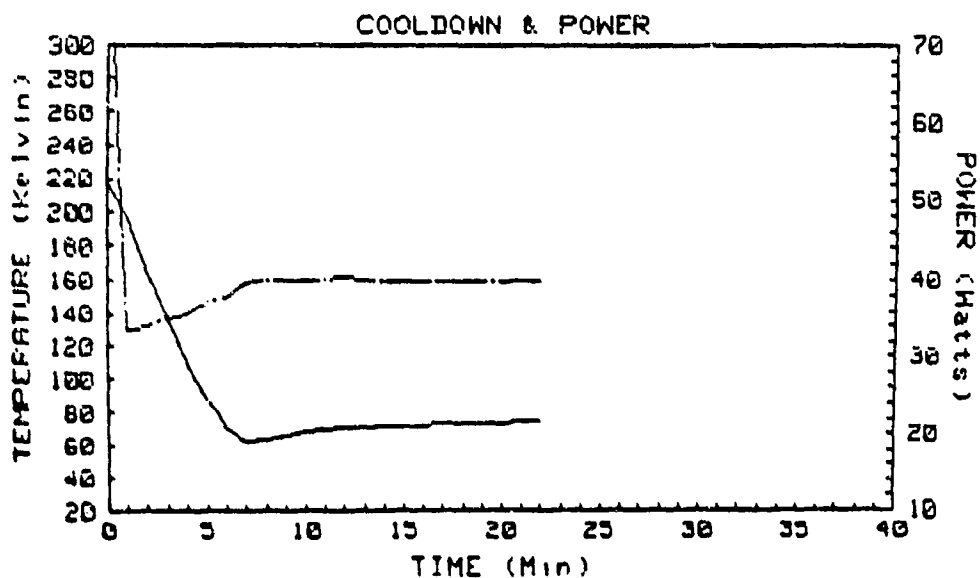
## CRYOGENIC COOLER DATA

COOLER: CTI 005  
VOLTAGE: 117  
AMBIENT: -54 C

DATE: 7-APR-88 16:17  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/D SBRC SN 1133

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	86.66	.739	217.80	0.000
1.00	33.64	.424	197.91	0.000
2.00	34.12	.426	166.93	0.000
3.00	35.15	.430	137.38	0.000
4.00	35.70	.433	110.35	0.000
4.55	36.35	.437	98.30	0.000
5.00	37.30	.444	88.25	0.000
5.45	37.55	.442	79.89	0.000
6.00	37.77	.446	70.50	0.000
7.00	39.69	.456	62.20	0.000
8.00	40.16	.458	63.69	0.000
9.00	40.16	.464	65.89	0.000
10.00	40.20	.461	67.58	0.000
11.00	40.03	.462	68.67	0.000
12.00	40.28	.458	69.98	0.000
13.00	40.01	.458	70.75	0.000
14.00	39.87	.458	71.40	0.000
15.00	39.80	.457	71.92	0.000
16.00	39.89	.458	72.37	0.000
17.00	39.95	.457	72.76	0.000
18.00	39.87	.458	73.09	0.000
19.00	39.96	.457	73.28	0.000
20.00	39.95	.458	73.54	0.000



## NVEOL CRYOGENIC COOLER LAB

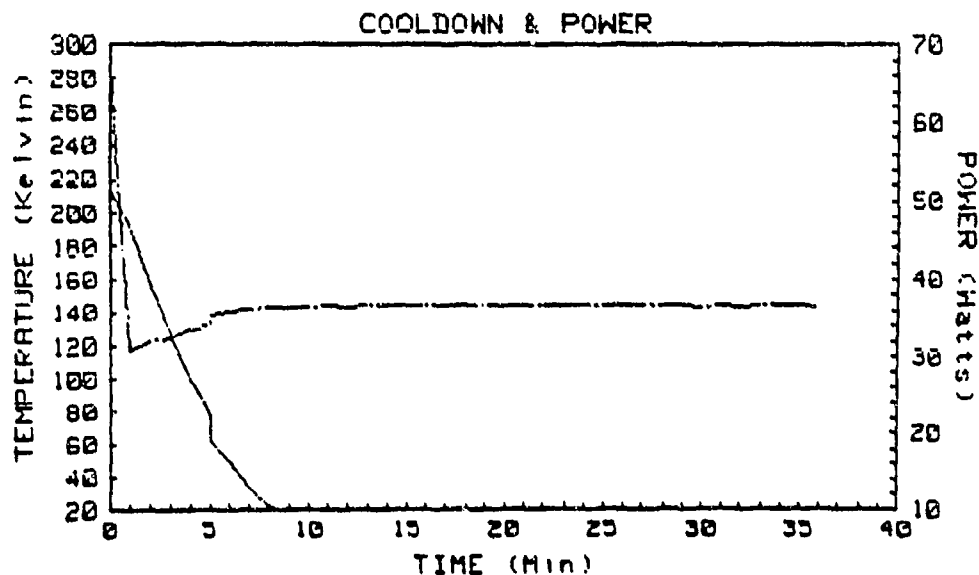
## CRYOGENIC COOLER DATA

COOLER: CTI 005  
 VOLTAGE: 108  
 AMBIENT: -54

DATE: 13 APR 86 11:09  
 ENGR: LEE  
 VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033 DT594 SBRC SN.1133

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	67.76	.715	213.92	0.000
1.00	30.95	.389	192.27	0.000
2.00	31.82	.396	158.70	0.000
3.00	32.59	.403	127.33	0.000
4.00	33.40	.409	100.05	0.000
4.12	33.47	.410	97.97	0.000
4.97	34.34	.416	78.40	0.000
5.00	35.36	.426	61.68	0.000
6.00	35.93	.431	49.43	0.000
7.00	36.25	.434	33.88	0.000
8.00	36.44	.436	21.82	0.000
9.00	36.54	.436	16.12	0.000
10.00	36.53	.436	13.85	0.000
11.00	36.66	.436	13.06	0.000
12.00	36.55	.436	13.06	0.000
13.00	36.61	.437	13.33	0.000
14.00	36.63	.437	13.66	0.000
15.00	36.64	.437	14.11	0.000
16.00	36.63	.436	14.44	0.000
17.00	36.60	.436	14.76	0.000
18.00	36.71	.437	15.06	0.000
19.00	36.70	.437	15.41	0.000
20.00	36.67	.436	15.60	0.000
30.00	36.54	.435	17.22	.000



NVEOL CRYOGENIC COOLER LAB

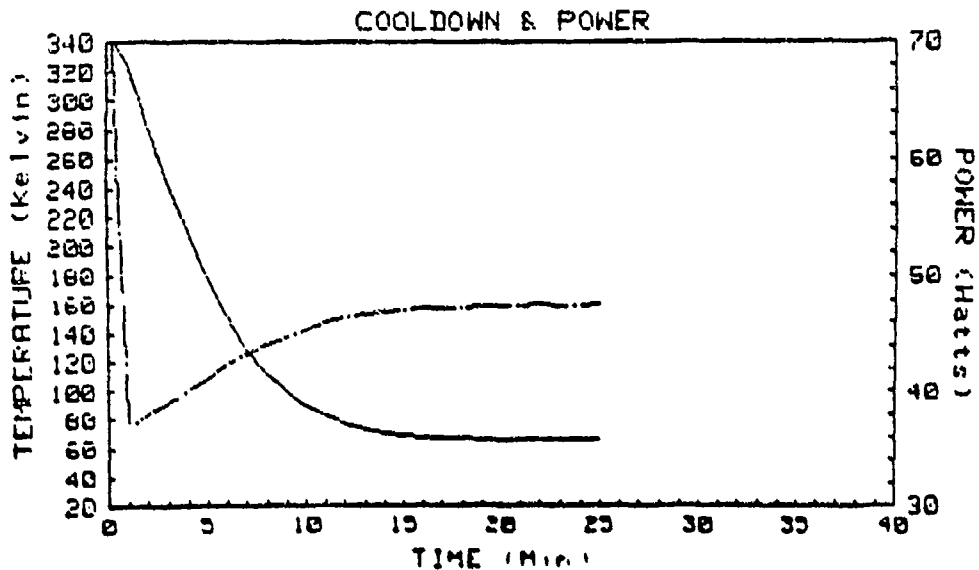
CRYOGENIC COOLER DATA

COOLER: CTI 005  
VOLTAGE: 117  
AMBIENT: 71

DATE: 15-APR-66 18:24  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 SBRC SN 1133

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	62.67	.796	351.11	0.000
1.00	36.92	.433	325.45	0.000
2.00	37.91	.441	284.75	0.000
3.00	39.00	.448	245.80	0.000
4.00	40.02	.455	210.55	0.000
5.00	41.11	.463	179.05	0.000
6.00	42.28	.471	152.61	0.000
7.00	43.21	.478	130.38	0.000
8.00	44.13	.485	113.33	0.000
9.00	44.69	.490	100.24	0.000
9.12	44.74	.491	99.33	0.000
10.00	45.30	.495	90.91	0.000
11.00	45.95	.500	83.33	0.000
11.55	46.18	.502	80.02	0.000
12.00	46.41	.504	77.56	0.000
13.00	46.71	.506	73.67	0.000
14.00	46.93	.508	71.21	0.000
15.00	47.09	.509	69.59	0.000
16.00	47.24	.510	68.62	0.000
17.00	47.27	.511	67.97	0.000
18.00	47.34	.512	67.45	0.000
19.00	47.45	.513	67.13	0.000
20.00	47.45	.512	66.93	0.000



NVEOL CRYOGENIC COOLER LAB

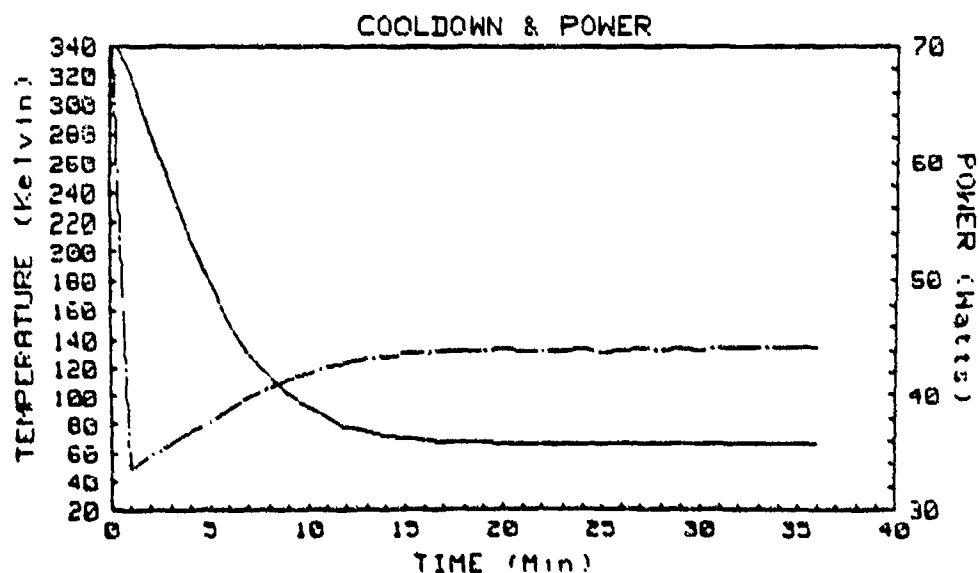
CRYOGENIC COOLER DATA

COOLER: CTI 005  
VOLTAGE: 106  
AMBIENT: 71

DATE: 14-APR-88 10:14  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033 DT594 SBRC SN.1133

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	73.71	.762	348.46	0.000
1.00	33.53	.403	323.77	0.000
2.00	34.74	.411	283.65	0.000
3.00	35.82	.419	245.15	0.000
4.00	36.62	.428	209.83	0.000
5.00	37.80	.435	179.44	0.000
6.00	38.64	.444	153.06	0.000
7.00	39.92	.456	131.74	0.000
8.00	40.60	.464	114.37	0.000
9.00	41.48	.470	101.54	0.000
9.18	41.62	.471	99.72	0.000
10.00	42.00	.474	92.01	0.000
11.00	42.62	.480	84.69	0.000
11.80	42.94	.484	79.89	0.000
12.00	43.06	.485	76.66	0.000
13.00	43.44	.488	74.58	0.000
14.00	43.61	.490	71.92	0.000
15.00	43.87	.493	70.17	0.000
16.00	43.94	.493	69.00	0.000
17.00	44.02	.495	68.29	0.000
18.00	44.14	.495	67.84	0.000
19.00	44.06	.496	67.45	0.000
20.00	44.21	.497	67.19	0.000
30.00	44.17	.496	66.48	.000



**COOLER/DEWAR**

**CTI / HONEYWELL  
(C6983G / NVL 001)**

# NVEOL CRYOGENIC COOLER LAB

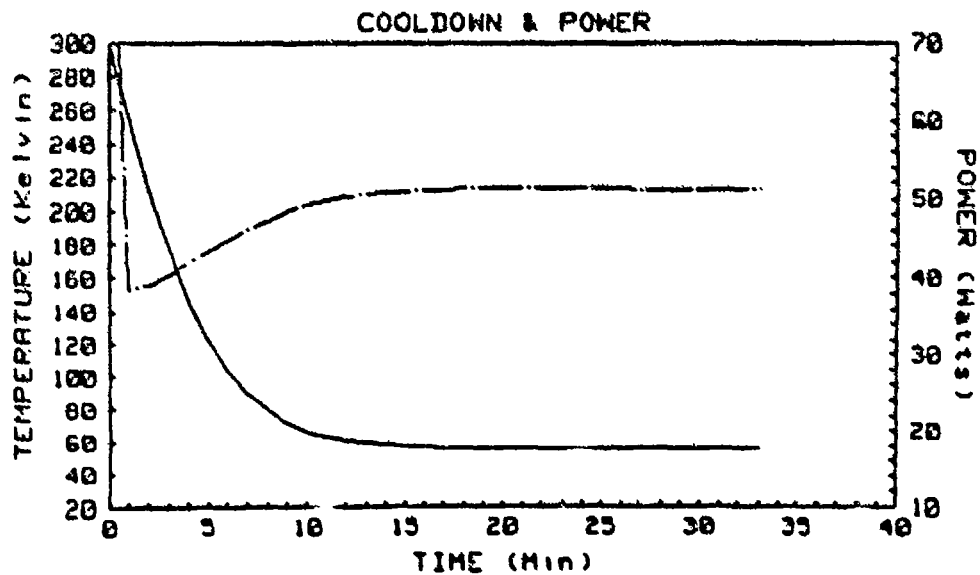
## CRYOGENIC COOLER DATA

COOLER: CTI C6983G  
VOLTAGE: 117  
AMBIENT: 24

DATE: 4 APR 88 15:13  
ENGR: H. KLING  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594-H.W. SN. NVL001

TIME	POWER	CURRENT	KELVIN	LOAD
0.00				
105.56 20.20				
.001	297.66	0.000		
1.00	38.47	.400	256.37	0.000
2.00	39.10	.407	213.08	0.000
3.00	40.44	.413	179.30	0.000
4.00	41.98	.424	147.48	0.000
5.00	43.34	.434	122.99	0.000
6.00	44.95	.443	103.90	0.000
6.28	45.25	.446	99.99	0.000
7.00	46.26	.453	90.48	0.000
8.00	47.36	.461	80.37	0.000
8.12	47.40	.462	79.47	0.000
9.00	48.54	.470	71.22	0.000
10.00	49.35	.477	65.86	0.000
11.00	49.90	.480	62.61	0.000
12.00	50.39	.483	60.45	0.000
13.00	50.60	.488	58.94	0.000
14.00	50.86	.489	57.92	0.000
15.00	51.01	.490	57.14	0.000
16.00	51.11	.490	56.65	0.000
17.00	51.33	.490	56.29	0.000
18.00	51.51	.492	55.99	0.000
19.00	51.39	.491	55.87	0.000
20.00	51.38	.490	55.75	0.000
30.00	51.25	.494	55.69	.000



# NVEOL CRYOGENIC COOLER LAB

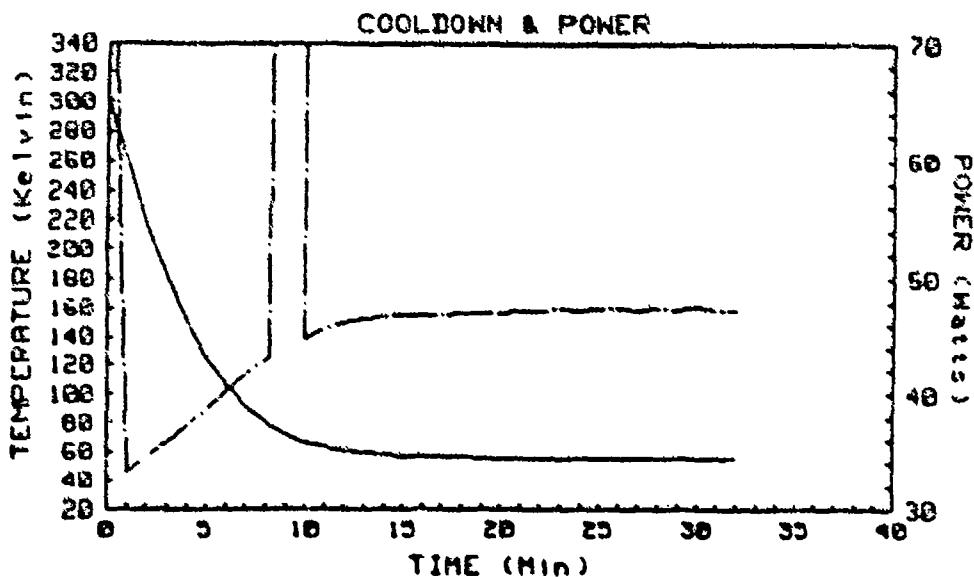
## CRYOGENIC COOLER DATA

COOLER: CTI C69636  
VOLTAGE: 106  
AMBIENT: 24

DATE: 5 APR 86 19:40  
ENGR: H KLING  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DTS94 HW SN. NVL001

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	93.37	.001	301.45	0.000
1.00	33.18	.369	260.04	0.000
2.00	34.33	.372	217.55	0.000
3.00	35.76	.391	181.91	0.000
4.00	37.18	.400	151.03	0.000
5.00	38.71	.412	126.06	0.000
6.00	40.21	.424	106.43	0.000
6.47	40.87	.430	99.81	0.000
7.00	41.64	.438	92.47	0.000
8.00	42.78	.446	82.16	0.000
8.28	43.04	.448	79.65	0.000
9.00				
1104.2	20.20			
	.455	72.67	0.000	
10.00	44.83	.464	66.77	0.000
11.00	45.60	.470	63.22	0.000
12.00	46.16	.475	60.67	0.000
13.00	46.51	.479	59.10	0.000
14.00	46.71	.482	58.10	0.000
15.00	46.89	.482	57.32	0.000
16.00	46.91	.482	56.77	0.000
17.00	46.98	.483	56.35	0.000
18.00	47.16	.485	56.11	0.000
19.00	47.07	.484	55.93	0.000
20.00	47.14	.486	55.76	0.000
30.00	47.56	.485	55.45	.000





NVEOL CRYOGENIC COOLER LAB

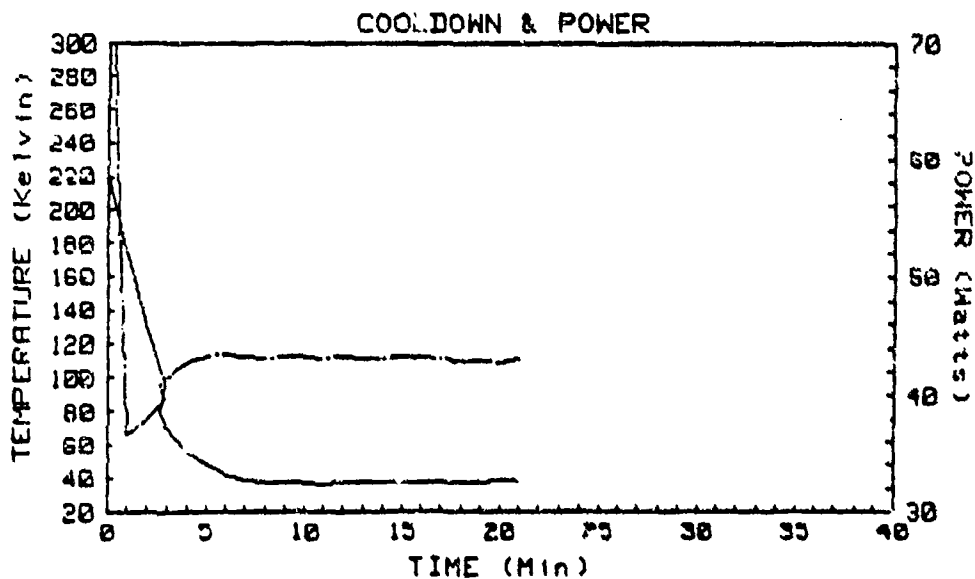
CRYOGENIC COOLER DATA

COOLER: CTI CTI C69836  
VOLTAGE: 117  
AMBIENT: -54

DATE: 12-APR-88 14:30  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT-594 HW SN/NVL001

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	83.64	.001	220.56	0.000
1.00	36.45	.406	176.74	0.000
2.00	37.93	.417	131.59	0.000
2.97	39.70	.433	96.02	0.000
2.62	40.80	.440	79.35	0.000
3.00	41.46	.452	70.02	0.000
4.00	42.60	.461	56.23	0.000
5.00	43.14	.464	47.87	0.000
6.00	43.48	.465	41.85	0.000
7.00	43.20	.461	38.78	0.000
8.00	43.12	.465	37.45	0.000
9.00	43.24	.459	36.79	0.000
10.00	43.15	.461	36.73	0.000
11.00	43.12	.463	36.61	0.000
12.00	43.20	.459	36.67	0.000
13.00	43.11	.463	36.73	0.000
14.00	43.10	.459	36.85	0.000
15.00	43.17	.462	36.91	0.000
16.00	43.24	.456	37.15	0.000
17.00	43.03	.462	37.33	0.000
18.00	42.80	.458	37.33	0.000
19.00	42.86	.458	37.69	0.000
20.00	42.75	.452	37.93	0.000



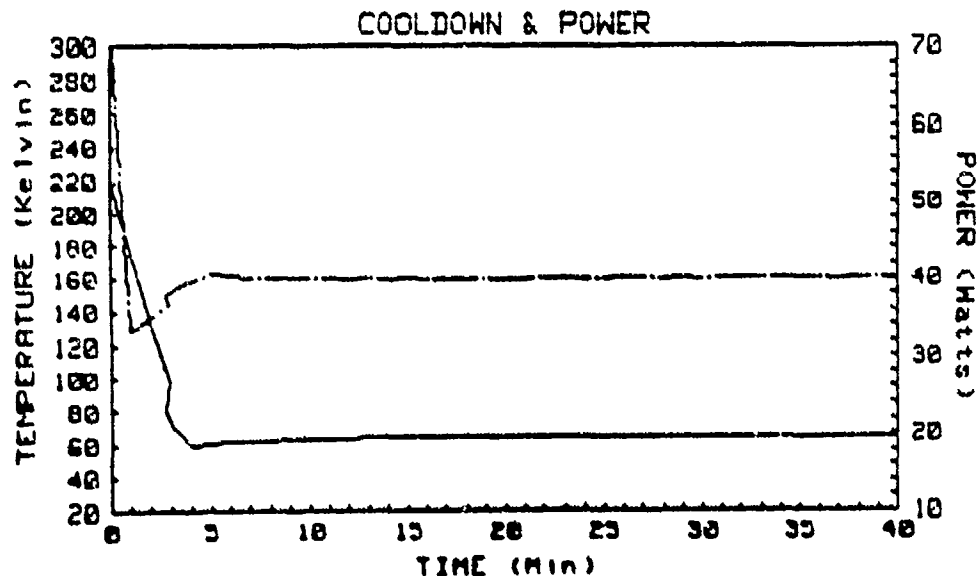
## CRYOGENIC COOLER DATA

COOLER: CTI 069836  
 VOLTAGE: 106  
 AMBIENT: -54

DATE: 7-APR-68 15:11  
 ENGR: H KLING  
 VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 HW SN.NVL001

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	76.07	.001	219.24	0.000
1.00	33.26	.378	176.96	0.000
2.00	34.84	.393	133.37	0.000
2.97	36.52	.411	98.42	0.000
2.70	37.79	.421	79.92	0.000
3.00	38.34	.427	72.39	0.000
4.00	39.62	.442	59.90	0.000
5.00	40.53	.449	60.23	0.000
6.00	40.27	.449	61.35	0.000
7.00	40.16	.448	61.87	0.000
8.00	40.14	.446	62.37	0.000
9.00	40.06	.445	62.81	0.000
10.00	40.16	.445	63.16	0.000
11.00	40.12	.444	63.47	0.000
12.00	39.96	.444	63.68	0.000
13.00	40.12	.445	63.89	0.000
14.00	39.97	.444	64.02	0.000
15.00	40.05	.444	64.12	0.000
16.00	39.99	.444	64.23	0.000
17.00	39.99	.443	64.29	0.000
18.00	39.97	.444	64.33	0.000
19.00	39.95	.443	64.40	0.000
20.00	39.96	.443	64.42	0.000
30.00	39.99	.443	64.58	.889
40.00	39.94	.443	64.65	2.108



## NVEOL CRYOGENIC COOLER LAB

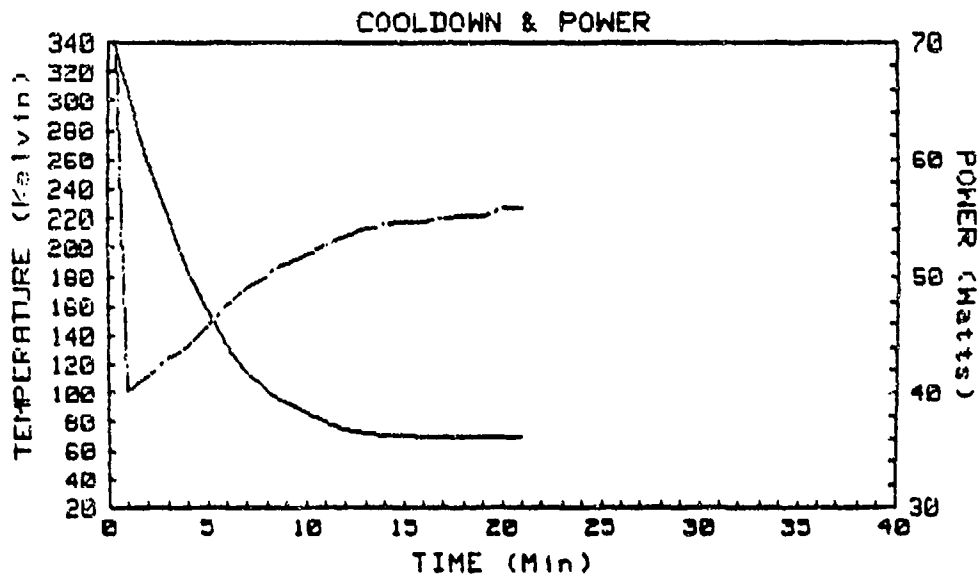
## CRYOGENIC COOLER DATA

COOLER: CTI C69836  
VOLTAGE: 117  
AMBIENT: 71

DATE: 19-APR-88 14:48  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT 594 HW NVL001

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	93.34	.909	353.46	0.000
1.00	40.20	.422	308.50	0.000
2.00	41.48	.431	261.37	0.000
3.00	43.04	.442	221.64	0.000
4.00	44.09	.457	186.91	0.000
5.00	45.92	.470	158.08	0.000
6.00	47.66	.487	134.00	0.000
7.00	49.01	.500	115.76	0.000
8.00	50.09	.511	102.28	0.000
8.28	50.39	.510	99.57	0.000
9.00	51.12	.520	93.07	0.000
10.00	51.84	.527	86.45	0.000
11.00	52.76	.532	80.67	0.000
11.18	52.72	.536	79.77	0.000
12.00	53.35	.547	75.67	0.000
13.00	54.07	.555	72.67	0.000
14.00	54.43	.559	71.04	0.000
15.00	54.75	.557	70.14	0.000
16.00	54.66	.555	69.48	0.000
17.00	55.02	.564	69.11	0.000
18.00	55.17	.563	68.93	0.000
19.00	55.25	.559	68.87	0.000
20.00	55.64	.568	68.87	0.000



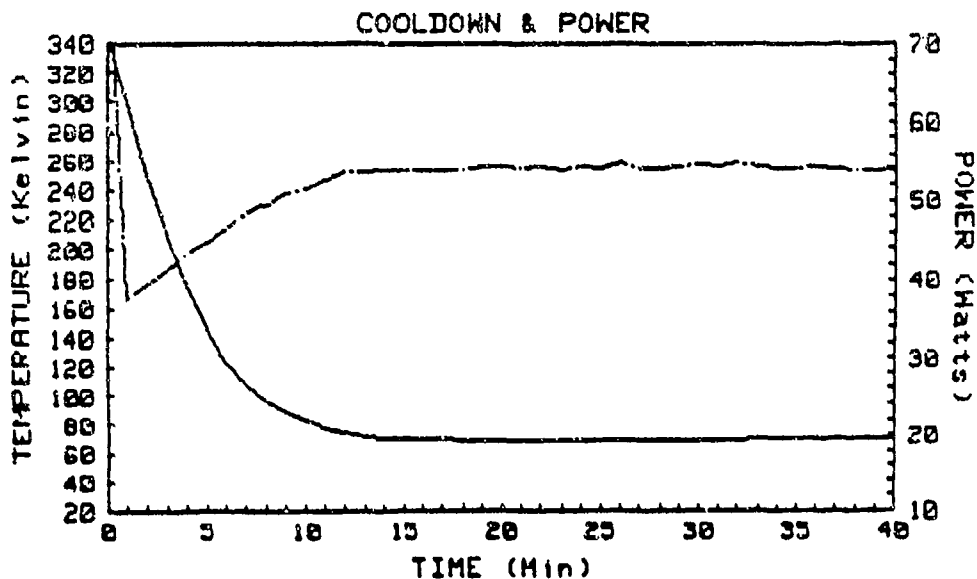
## CRYOGENIC COOLER DATA

COOLER: CTI C69836  
 VOLTAGE: 108  
 AMBIENT: 71

DATE: 15-APR-88 16:07  
 ENGR: LEE  
 VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 SN HW-NVL001

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	82.88	.864	346.54	0.000
1.00	37.52	.405	299.95	0.000
2.00	39.34	.423	251.50	0.000
3.00	41.29	.444	210.99	0.000
4.00	43.31	.463	175.83	0.000
5.00	44.74	.479	147.30	0.000
6.00	46.60	.499	124.61	0.000
7.00	48.20	.517	108.48	0.000
7.78	49.42	.530	99.27	0.000
8.00	49.43	.532	96.92	0.000
9.00	51.01	.556	89.34	0.000
10.00	51.60	.563	83.38	0.000
10.63	51.99	.558	79.95	0.000
11.00	52.52	.567	77.96	0.000
12.00	53.73	.574	74.29	0.000
13.00	53.68	.585	72.36	0.000
14.00	53.85	.588	71.28	0.000
15.00	53.86	.586	70.68	0.000
16.00	53.95	.586	70.26	0.000
17.00	53.92	.586	70.08	0.000
18.00	54.00	.589	69.96	0.000
19.00	54.53	.596	69.84	0.000
20.00	54.46	.592	69.84	0.000
30.00	54.68	.592	69.96	.000
40.00	54.04	.585	70.14	.000



**COOLER/DEWAR**

**CTI / TI**  
**(C6979E / 15138)**

# NVEOL CRYOGENIC COOLER LAB

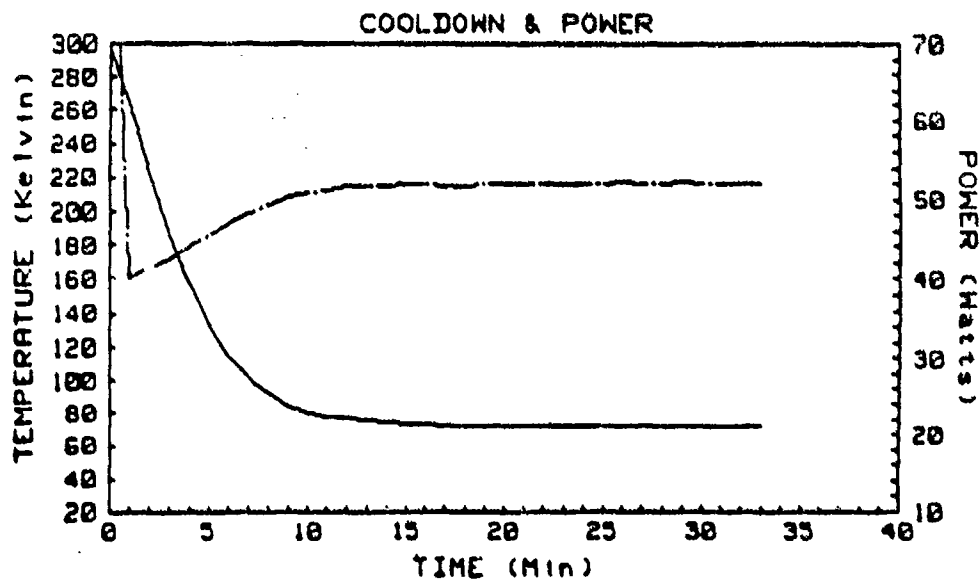
## CRYOGENIC COOLER DATA

COOLER: CTI C6879E  
VOLTAGE: 117  
AMBIENT: 24

DATE: 4 APR 88 15:57  
ENGR: H. KLING  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/ DT-594 TI SN-15138

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	96.06	.794	297.00	0.000
1.00	40.12	.444	263.64	0.000
2.00	41.36	.452	221.87	0.000
3.00	42.48	.459	186.97	0.000
4.00	44.22	.470	157.40	0.000
5.00	45.45	.476	133.67	0.000
6.00	47.02	.488	114.98	0.000
7.00	48.43	.496	102.03	0.000
7.28	48.55	.497	99.36	0.000
8.00	49.27	.502	92.33	0.000
9.00	50.49	.511	84.69	0.000
10.00	50.88	.513	80.26	0.000
10.13	51.02	.513	80.02	0.000
11.00	51.31	.515	78.01	0.000
12.00	51.69	.518	76.29	0.000
13.00	51.73	.518	74.93	0.000
14.00	51.80	.520	73.99	0.000
15.00	51.93	.518	73.28	0.000
16.00	51.95	.518	72.75	0.000
17.00	51.86	.520	72.39	0.000
18.00	51.85	.521	72.09	0.000
19.00	51.99	.521	71.86	0.000
20.00	51.94	.520	71.74	0.000
30.00	52.14	.520	71.27	0.000



# NVEOL CRYOGENIC COOLER LAB

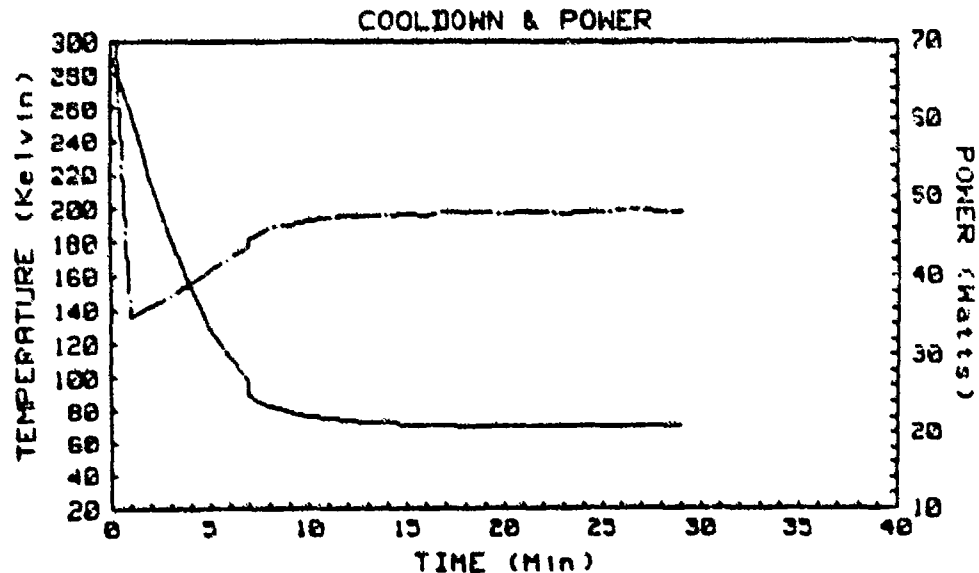
## CRYOGENIC COOLER DATA

COOLER: CTI C6879E  
VOLTAGE: 108  
AMBIENT: 24

DATE: 6 APR 11:02  
ENGR: H KLING  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033//DT594 TI SN. 15138

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	84.21	.001	292.15	0.000
1.00	34.79	.413	259.26	0.000
2.00	36.06	.421	217.32	0.000
3.00	37.47	.431	182.42	0.000
4.00	39.18	.444	152.96	0.000
5.00	40.60	.454	129.95	0.000
6.00	42.26	.466	111.96	0.000
6.97	43.53	.476	99.31	0.000
7.00	44.58	.484	89.66	0.000
8.00	45.82	.495	82.80	0.000
8.80	46.42	.498	79.90	0.000
9.00	46.47	.499	79.31	0.000
10.00	46.95	.502	77.18	0.000
11.00	47.22	.503	75.47	0.000
12.00	47.42	.507	74.16	0.000
13.00	47.56	.506	73.22	0.000
14.00	47.61	.507	72.57	0.000
15.00	47.67	.510	72.04	0.000
16.00	47.65	.508	71.62	0.000
17.00	48.16	.512	71.38	0.000
18.00	48.05	.510	71.15	0.000
19.00	48.09	.513	70.97	0.000
20.00	47.92	.511	70.91	0.000



## NVEOL CRYOGENIC COOLER LAB

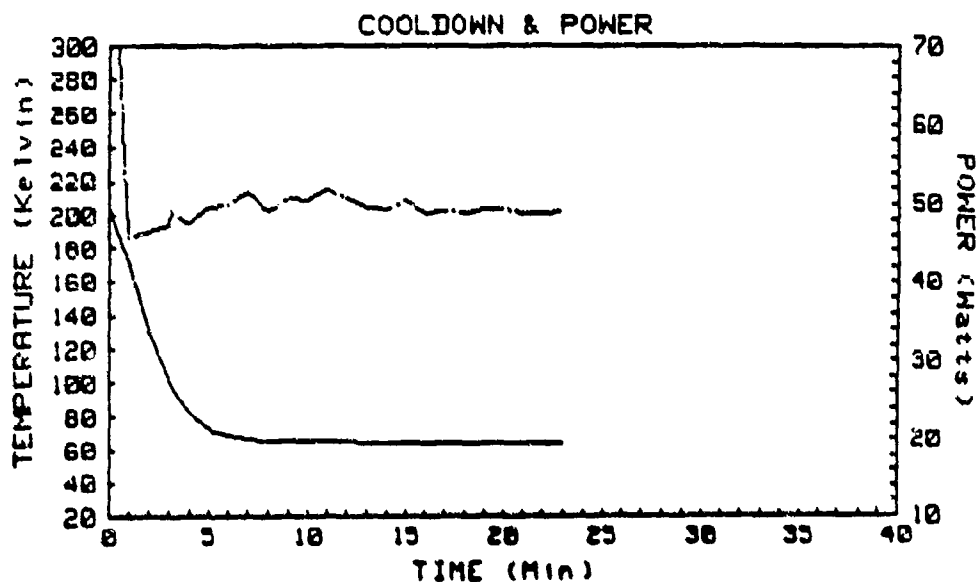
## CRYOGENIC COOLER DATA

COOLER: CTI C6679E  
VOLTAGE: 117  
AMBIENT: -54

DATE: 6-APR-66 15:04  
ENGR: L HOYLE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 TI SN: 15138

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	94.31	.820	205.49	0.000
1.00	45.68	.496	172.24	0.000
2.00	46.48	.503	132.55	0.000
3.00	47.14	.507	102.68	0.000
3.18	48.99	.506	98.65	0.000
4.00	47.51	.517	82.80	0.000
4.28	48.20	.510	79.55	0.000
5.00	49.59	.523	72.63	0.000
6.00	49.99	.523	68.96	0.000
7.00	51.48	.519	66.83	0.000
8.00	49.18	.524	65.88	0.000
9.00	50.65	.526	65.59	0.000
10.00	50.45	.528	65.41	0.000
11.00	51.88	.534	65.23	0.000
12.00	50.69	.531	65.11	0.000
13.00	49.54	.518	65.00	0.000
14.00	49.51	.521	64.94	0.000
15.00	50.40	.523	64.94	0.000
16.00	48.82	.521	64.94	0.000
17.00	49.07	.524	64.88	0.000
18.00	48.97	.516	64.88	0.000
19.00	49.37	.518	64.88	0.000
20.00	49.32	.517	64.88	0.000





## NVEOL CRYOGENIC COOLER LAB

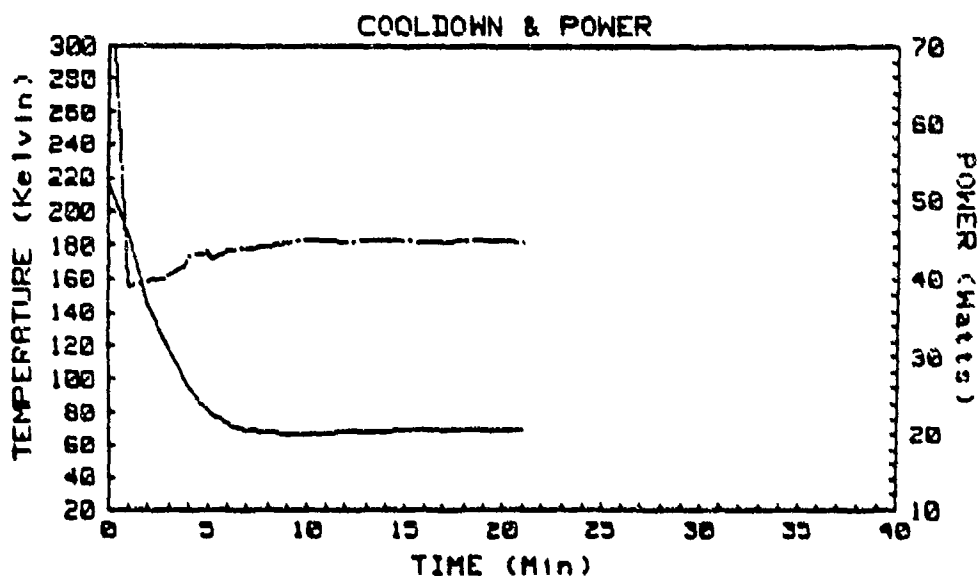
## CRYOGENIC COOLER DATA

COOLER: CTI C6679E  
VOLTAGE: 106  
AMBIENT: -54

DATE: 7-APR-66 16:21  
ENGR: H KLING  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 TI SN.15138

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	86.09	.810	217.85	0.000
1.00	39.07	.455	185.91	0.000
2.00	39.64	.457	147.16	0.000
3.00	40.51	.456	117.23	0.000
3.76	41.33	.467	99.78	0.000
4.00	42.90	.481	95.46	0.000
5.00	43.67	.487	81.36	0.000
5.20	42.64	.477	79.73	0.000
6.00	43.59	.483	73.28	0.000
7.00	43.96	.486	69.37	0.000
8.00	44.21	.489	67.89	0.000
9.00	44.60	.493	67.07	0.000
10.00	44.82	.494	66.77	0.000
11.00	44.77	.493	67.07	0.000
12.00	44.69	.496	67.60	0.000
13.00	44.90	.497	68.19	0.000
14.00	44.82	.496	68.66	0.000
15.00	44.88	.494	69.08	0.000
16.00	44.70	.496	69.31	0.000
17.00	44.51	.491	69.55	0.000
18.00	44.77	.492	69.67	0.000
19.00	44.95	.495	69.79	0.000
20.00	44.76	.495	69.85	0.000



# NVEOL CRYOGENIC COOLER LAB

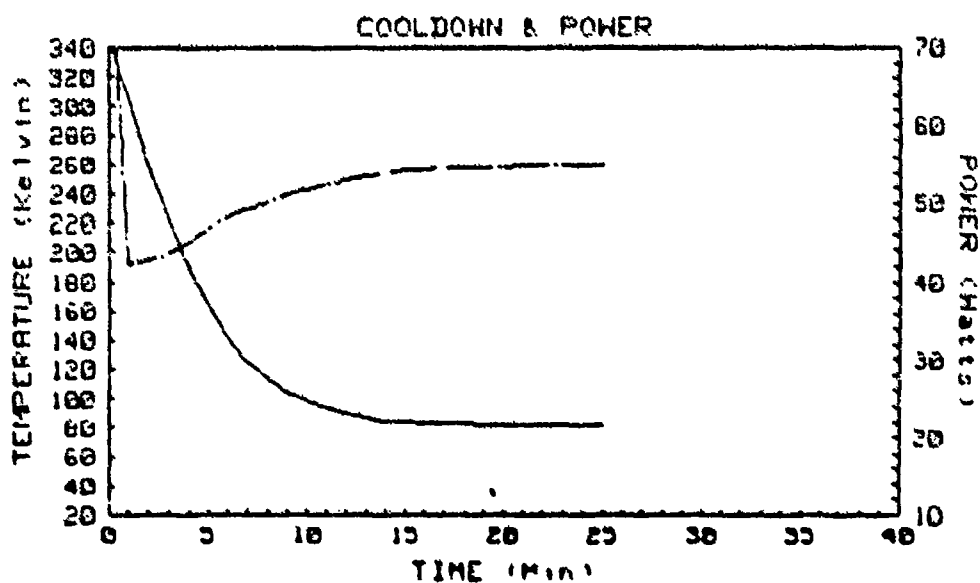
## CRYOGENIC COOLER DATA

COOLER: CTI C6679E  
VOLTAGE: 117  
AMBIENT: 71

DATE: 19-APR-68 14:13  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 TI SN 15138

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	89.18	.001	345.45	0.000
1.00	42.30	.463	307.65	0.000
2.00	42.87	.467	261.27	0.000
3.00	43.55	.475	223.06	0.000
4.00	45.00	.484	191.17	0.000
5.00	46.73	.495	164.55	0.000
6.00	48.21	.513	143.06	0.000
7.00	49.45	.517	126.22	0.000
8.00	50.28	.530	113.98	0.000
9.00	51.13	.539	104.87	0.000
9.60	51.74	.545	99.90	0.000
10.00	51.84	.546	98.65	0.000
11.00	52.46	.551	94.10	0.000
12.00	53.17	.560	90.43	0.000
13.00	53.69	.564	87.30	0.000
14.00	53.96	.564	85.52	0.000
15.00	54.31	.570	84.34	0.000
16.00	54.46	.571	83.63	0.000
17.00	54.78	.574	83.16	0.000
18.00	54.80	.576	82.80	0.000
19.00	54.75	.573	82.56	0.000
20.00	54.80	.573	82.27	0.000



# NVEOL CRYOGENIC COOLER LAB

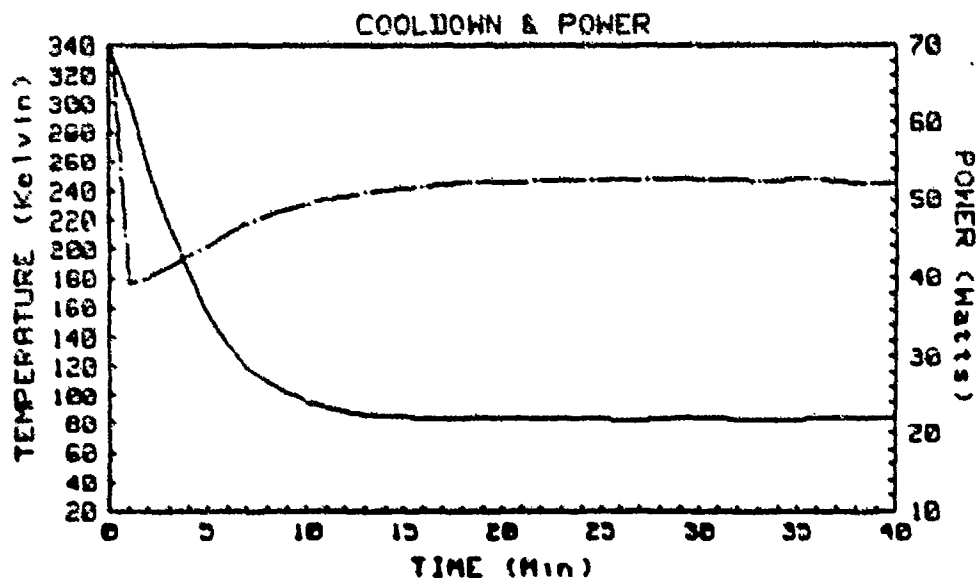
## CRYOGENIC COOLER DATA

COOLER: CTI 66679E  
VOLTAGE: 108  
AMBIENT: 71

DATE: 15-APR-86 17:00  
ENGR: LEE  
VERIFIED BY:

TEST: REDUCED VOLTAGE TEST HD-1033/DT594 TI SN 15138

TIME	POWER	CURRENT	KELVIN	LOAD
0.00	79.20	.823	342.43	0.000
1.00	39.37	.444	304.04	0.000
2.00	40.02	.453	256.77	0.000
3.00	41.42	.467	217.00	0.000
4.00	42.99	.480	183.54	0.000
5.00	44.16	.490	156.98	0.000
6.00	45.67	.508	135.92	0.000
7.00	46.89	.519	120.72	0.000
8.00	48.05	.528	108.66	0.000
9.00	48.96	.537	102.03	0.000
9.37	49.09	.542	99.96	0.000
10.00	49.58	.546	96.53	0.000
11.00	50.20	.553	92.50	0.000
12.00	50.45	.557	89.19	0.000
13.00	50.87	.564	86.76	0.000
14.00	51.25	.565	85.29	0.000
15.00	51.54	.571	84.40	0.000
16.00	51.71	.574	83.81	0.000
17.00	51.92	.578	83.45	0.000
18.00	52.21	.572	83.16	0.000
19.00	52.28	.572	83.04	0.000
20.00	52.21	.580	82.98	0.000
30.00	52.50	.579	82.74	.000



**APPENDIX B**  
**RESTART DATA**

**COOLER/DEWAR**

**AEG      AEG**  
**(LV-2528 / A2516)**

# RESTART TEST

COOLER MANUFACTURER	<u>AEG</u>	S/N <u>LV-2528</u>
DEWAR MANUFACTURER	<u>AEG</u>	S/N <u>A2516</u>
DIODE CALIBRATION	<u>.6976</u> 297K	<u>LO56</u> 77.3K
AMBIENT TEMPERATURE	<u>23°</u> C	

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)

INPUT VOLTAGE	<u>117</u> V(AC)
CURRENT	<u>900</u> AMPS
POWER	<u>46.95</u> WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

☒ YES ☐ NO  
\_\_\_\_ SEC

### CYCLE 2

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

☒ YES ☐ NO  
\_\_\_\_ SEC

### CYCLE 3

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

☒ YES ☐ NO  
\_\_\_\_ SEC

### CYCLE 4

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

☒ YES ☐ NO  
\_\_\_\_ SEC

### CYCLE 5

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

☒ YES ☐ NO  
\_\_\_\_ SEC

# RESTART TEST

COOLER MANUFACTURER	<u>AEG</u>	S/N	<u>LV-2528</u>
DEWAR MANUFACTURER	<u>AEG</u>	S/N	<u>A2516</u>
DIODE CALIBRATION	<u>.6976</u>	297K	<u>1.056</u> 77.3K
AMBIENT TEMPERATURE	<u>23°</u>	C	

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)

INPUT VOLTAGE	<u>108</u>	V(AC)
CURRENT	<u>.482</u>	AMPS
POWER	<u>42.7</u>	WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/>	YES <input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u>	SEC

### CYCLE 2

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/>	YES <input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u>	SEC

### CYCLE 3

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/>	YES <input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u>	SEC

### CYCLE 4

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/>	YES <input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u>	SEC

### CYCLE 5

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/>	YES <input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u>	SEC

# RESTART TEST

COOLER MANUFACTURER AEG  
 DEWAR MANUFACTURER AEG  
 DIODE CALIBRATION .6976 297K  
 AMBIENT TEMPERATURE -54° C

S/N LV-2528  
 S/N A2516  
1.056 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)

INPUT VOLTAGE 117 V(AC)  
 CURRENT .521 AMPS  
 POWER 46.31 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC



# RESTART TEST

COOLER MANUFACTURER	<u>AEG</u>	S/N	<u>LV-2528</u>
DEWAR MANUFACTURER	<u>AEG</u>	S/N	<u>A2516</u>
DIODE CALIBRATION	<u>.6976</u> 297K		<u>1.056</u> 77.3K
AMBIENT TEMPERATURE	<u>-54°</u> C		

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)			
INPUT VOLTAGE	<u>108</u>	V (AC)	
CURRENT	<u>.483</u>	AMPS	
POWER	<u>42.8</u>	WATTS	

## RESTART TEST

CYCLE 1		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<u>✓</u> YES	NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 2		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<u>✓</u> YES	NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 3		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<u>✓</u> YES	NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 4		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<u>✓</u> YES	NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 5		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<u>✓</u> YES	NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

# RESTART TEST

COOLER MANUFACTURER	<u>AEG</u>	S/N <u>LV-2528</u>
DEWAR MANUFACTURER	<u>AEG</u>	S/N <u>A2516</u>
DIODE CALIBRATION	<u>.6976</u> 297K	<u>1.056</u> 77.3K
AMBIENT TEMPERATURE	<u>71°</u> C	

DATA WHEN DEWAR DIODE REACHES 75K (1.0997 V)

INPUT VOLTAGE	<u>117</u> V(AC)
CURRENT	<u>.526</u> AMPS
POWER	<u>50.12</u> WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER	<u>AEG</u>	S/N	<u>LV-2528</u>
DEWAR MANUFACTURER	<u>AEG</u>	S/N	<u>A2516</u>
DIODE CALIBRATION	<u>.6976</u> 297K	<u>1.056</u>	77.3K
AMBIENT TEMPERATURE	<u>71°</u> C		

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)

INPUT VOLTAGE	<u>108</u> V(AC)
CURRENT	<u>.516</u> AMPS
POWER	<u>46.91</u> WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

**COOLER/DEWAR**

**AEG / AEG**  
**(LV-1945 / A2754)**

# RESTART TEST

COOLER MANUFACTURER AEG  
 DEWAR MANUFACTURER AEG  
 DIODE CALIBRATION .7005 297K  
 AMBIENT TEMPERATURE 23° C

S/N LV-1945  
 S/N A2754  
1056 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)  
 INPUT VOLTAGE 117 V(AC)  
 CURRENT .515 AMPS  
 POWER 48.28 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES 1 NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES 1 NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES 1 NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES 1 NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES 1 NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER AEG  
 DEWAR MANUFACTURER AEG  
 DIODE CALIBRATION .7005 297K  
 AMBIENT TEMPERATURE 23 C

S/N LV-1945  
 S/N A2754  
1.056 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)  
 INPUT VOLTAGE 108 V(AC)  
 CURRENT .499 AMPS  
 POWER 44.95 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER AEG  
 DEWAR MANUFACTURER AEG  
 DIODE CALIBRATION .7005 297K  
 AMBIENT TEMPERATURE -54° C

S/N LV-1945  
 S/N A2754  
1.056 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)

INPUT VOLTAGE 117 V(AC)  
 CURRENT .444 AMPS  
 POWER 39.13 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER	<u>AEG</u>	S/N <u>LV-1945</u>
DEWAR MANUFACTURER	<u>AEG</u>	S/N <u>A2754</u>
DIODE CALIBRATION	<u>.7005</u> 297K	<u>1.056</u> 77.3K
AMBIENT TEMPERATURE	<u>-54°</u> C	

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)

INPUT VOLTAGE	<u>108</u> V(AC)
CURRENT	<u>.412</u> AMPS
POWER	<u>35.53</u> WATTS

## RESTART TEST

CYCLE 1		
OFF 2 SEC		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
RESTART WITHIN 5 SEC		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 2		
OFF 2 SEC		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
RESTART WITHIN 5 SEC		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 3		
OFF 2 SEC		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
RESTART WITHIN 5 SEC		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 4		
OFF 2 SEC		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
RESTART WITHIN 5 SEC		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 5		
OFF 2 SEC		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
RESTART WITHIN 5 SEC		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	



# RESTART TEST

COOLER MANUFACTURER AEG  
 DEWAR MANUFACTURER AEG  
 DIODE CALIBRATION .7005 297K  
 AMBIENT TEMPERATURE 71° C

S/N LV-1945  
 S/N A2754  
1.056 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)

INPUT VOLTAGE 117 V(AC)  
 CURRENT .569 AMPS  
 POWER 54.65 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

# RESTART TEST

COOLER MANUFACTURER AEG  
 DEWAR MANUFACTURER AEG  
 DIODE CALIBRATION 7005 297K  
 AMBIENT TEMPERATURE 71° C

S/N LV-1945  
 S/N A2754  
1.056 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)

INPUT VOLTAGE 108 V(AC)  
 CURRENT .588 AMPS  
 POWER 52.47 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES     NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES     NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES     NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES     NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES     NO  
1 SEC

**COOLER/DEWAR**

**AEG / AEG**  
**(LV-2349 / A3047)**

# RESTART TEST

COOLER MANUFACTURER	<u>AEG</u>	S/N	<u>LV-2349</u>
DEWAR MANUFACTURER	<u>AEG</u>	S/N	<u>A3047</u>
DIODE CALIBRATION	<u>.7029</u> 297K		<u>1.056</u> 77.3K
AMBIENT TEMPERATURE	<u>23°</u> C		

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)

INPUT VOLTAGE	<u>117</u> V(AC)
CURRENT	<u>.503</u> AMPS
POWER	<u>46.72</u> WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

✓ YES 1 SEC NO

### CYCLE 2

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

✓ YES 1 SEC NO

### CYCLE 3

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

✓ YES 1 SEC NO

### CYCLE 4

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

✓ YES 1 SEC NO

### CYCLE 5

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

✓ YES 1 SEC NO

# RESTART TEST

COOLER MANUFACTURER AEG  
 DEWAR MANUFACTURER AEG  
 DIODE CALIBRATION .7029 297K  
 AMBIENT TEMPERATURE 23° C

S/N LV-2349  
 S/N A3047  
1.056 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)  
 INPUT VOLTAGE 108 V(AC)  
 CURRENT .489 AMPS  
 POWER 43.65 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES 1 SEC NO

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES 1 SEC NO

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES 1 SEC NO

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES 1 SEC NO

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES 1 SEC NO

# RESTART TEST

COOLER MANUFACTURER	<u>AEG</u>	S/N	<u>LV-2349</u>
DEWAR MANUFACTURER	<u>AEG</u>	S/N	<u>A3047</u>
DIODE CALIBRATION	<u>.7029</u> 297K		
AMBIENT TEMPERATURE	<u>-54°</u> C		<u>1.076</u> 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)

INPUT VOLTAGE	<u>117</u>	V(AC)
CURRENT	<u>.915</u>	AMPS
POWER	<u>46.88</u>	WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES      NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES      NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES      NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES      NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES      NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER AEG  
 DEWAR MANUFACTURER AEG  
 DIODE CALIBRATION .7029 297K  
 AMBIENT TEMPERATURE -54° C

S/N LV-2349  
 S/N A3047  
1.056 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)

INPUT VOLTAGE 108 V(AC)  
 CURRENT .508 AMPS  
 POWER 44.28 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER AEG  
 DEWAR MANUFACTURER AEG  
 DIODE CALIBRATION .7029 297K  
 AMBIENT TEMPERATURE 71° C

S/N LV-2349  
 S/N A3047  
1.056 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)  
 INPUT VOLTAGE 117 V(AC)  
 CURRENT .551 AMPS  
 POWER 52.3 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES     NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES     NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES     NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES     NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

✓  
✓ YES     NO  
1 SEC



# RESTART TEST

COOLER MANUFACTURER	<u>AEG</u>	S/N <u>LV-2349</u>
DEWAR MANUFACTURER	<u>AEG</u>	S/N <u>A3047</u>
DIODE CALIBRATION	<u>.7029</u> 297K	<u>L056</u> 77.3K
AMBIENT TEMPERATURE	<u>71°</u> C	

DATA WHEN DEWAR DIODE REACHES 75K (1.0597 V)		
INPUT VOLTAGE	<u>108</u>	V(AC)
CURRENT	<u>.543</u>	AMPS
POWER	<u>49.2</u>	WATTS

## RESTART TEST

CYCLE 1		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 2		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 3		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 4		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 5		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

**COOLER/DEWAR**

**CTI CS / SBRC**  
**(005 / 1133)**

# RESTART TEST

COOLER MANUFACTURER	<u>CTI</u>	S/N	<u>CS005</u>
DEWAR MANUFACTURER	<u>SBRC</u>	S/N	<u>1133</u>
DIODE CALIBRATION	<u>.7170</u> 297K		<u>1.056</u> 77.3K
AMBIENT TEMPERATURE	<u>23°</u> C		

DATA WHEN DEWAR DIODE REACHES 75K (1.0596 V)

INPUT VOLTAGE	<u>117</u> V(AC)
CURRENT	<u>.478</u> AMPS
POWER	<u>42.95</u> WATTS

## RESTART TEST

CYCLE 1		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 2		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 3		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 4		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	
CYCLE 5		
OFF 2 SEC		
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

# RESTART TEST

COOLER MANUFACTURER	<u>CTI</u>	S/N	<u>CS005</u>
DEWAR MANUFACTURER	<u>SBRC</u>	S/N	<u>1133</u>
DIODE CALIBRATION	<u>.7170</u> 297K	<u>1.056</u>	77.3K
AMBIENT TEMPERATURE	<u>23°</u> C		

DATA WHEN DEWAR DIODE REACHES 75K (1.0596 V)

INPUT VOLTAGE	<u>108</u> V(AC)
CURRENT	<u>.460</u> AMPS
POWER	<u>39.9</u> WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
RESTART WITHIN 5 SEC  
TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER CTI  
 DEWAR MANUFACTURER SBRC  
 DIODE CALIBRATION .7170 297K  
 AMBIENT TEMPERATURE -54° C

S/N CS005  
 S/N 1133  
1.056 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0596 V)

INPUT VOLTAGE 117 V(AC)  
 CURRENT .446 AMPS  
 POWER 37.66 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER CTI  
 DEWAR MANUFACTURER SBRC  
 DIODE CALIBRATION .7170 297K  
 AMBIENT TEMPERATURE -54° C

S/N CS005  
 S/N 1133  
1.056 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0596 V)

INPUT VOLTAGE 108 V(AC)  
 CURRENT .421 AMPS  
 POWER 35.01 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER	<u>CTI</u>	S/N <u>CS005</u>
DEWAR MANUFACTURER	<u>SBRC</u>	S/N <u>1133</u>
DIODE CALIBRATION	<u>.7170</u> 297K	<u>1.056</u> 77.3K
AMBIENT TEMPERATURE	<u>71°</u> C	

DATA WHEN DEWAR DIODE REACHES 75K (1.0596 V)

INPUT VOLTAGE	<u>117</u> V(AC)
CURRENT	<u>.506</u> AMPS
POWER	<u>46.7</u> WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

### CYCLE 2

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

### CYCLE 3

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

### CYCLE 4

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

### CYCLE 5

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

# RESTART TEST

COOLER MANUFACTURER CTI  
 DEWAR MANUFACTURER SBRC  
 DIODE CALIBRATION .7170 297K  
 AMBIENT TEMPERATURE 71° C

S/N CS005  
 S/N 1133  
1.056 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0596 V)  
 INPUT VOLTAGE 108 V(AC)  
 CURRENT .488 AMPS  
 POWER 43.42 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC



**COOLER/DEWAR**

**CTI / HONEYWELL  
(C6983G / NVL 001)**

# RESTART TEST

COOLER MANUFACTURER	<u>CTI</u>	S/N <u>C6983G</u>
DEWAR MANUFACTURER	<u>HW</u>	S/N <u>NVL001</u>
DIODE CALIBRATION	<u>.6910</u> 297K	<u>1.056</u> 77.3K
AMBIENT TEMPERATURE	<u>23°</u> C	

DATA WHEN DEWAR DIODE REACHES 75K (1.0598 V)

INPUT VOLTAGE	<u>117</u> V(AC)
CURRENT	<u>.496</u> AMPS
POWER	<u>44.01</u> WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

<input checked="" type="checkbox"/>	YES	<input type="checkbox"/> NO
<u>1</u>	SEC	

### CYCLE 2

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

<input checked="" type="checkbox"/>	YES	<input type="checkbox"/> NO
<u>1</u>	SEC	

### CYCLE 3

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

<input checked="" type="checkbox"/>	YES	<input type="checkbox"/> NO
<u>1</u>	SEC	

### CYCLE 4

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

<input checked="" type="checkbox"/>	YES	<input type="checkbox"/> NO
<u>1</u>	SEC	

### CYCLE 5

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

<input checked="" type="checkbox"/>	YES	<input type="checkbox"/> NO
<u>1</u>	SEC	

# RESTART TEST

COOLER MANUFACTURER	<u>CTI</u>	S/N <u>C69836</u>
DEWAR MANUFACTURER	<u>HW</u>	S/N <u>NYL001</u>
DIODE CALIBRATION	<u>.6910</u> 297K	<u>1.056</u> 77.3K
AMBIENT TEMPERATURE	<u>23°</u> C	

DATA WHEN DEWAR DIODE REACHES 75K (1.0598 V)

INPUT VOLTAGE	<u>108</u> V(AC)
CURRENT	<u>.448</u> AMPS
POWER	<u>41.5</u> WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

### CYCLE 2

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

### CYCLE 3

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

### CYCLE 4

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

### CYCLE 5

OFF 2 SEC	<input checked="" type="checkbox"/>	
RESTART WITHIN 5 SEC	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

# RESTART TEST

COOLER MANUFACTURER CTI  
 DEWAR MANUFACTURER HW  
 DIODE CALIBRATION .6910 297K  
 AMBIENT TEMPERATURE -54° C

S/N C6983G  
 S/N NVL001  
1.056 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0598 V)

INPUT VOLTAGE 117 V(AC)  
 CURRENT .424 AMPS  
 POWER 39.2 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER	<u>CTI</u>	S/N <u>C6983G</u>
DEWAR MANUFACTURER	<u>HW</u>	S/N <u>NVL001</u>
DIODE CALIBRATION	<u>.6910</u> 297K	<u>1.056</u> 77.3K
AMBIENT TEMPERATURE	<u>-54°</u> C	

DATA WHEN DEWAR DIODE REACHES 75K (1.0598 V)

INPUT VOLTAGE	<u>108</u> V(AC)
CURRENT	<u>.423</u> AMPS
POWER	<u>37.5</u> WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
4 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER CTI  
 DEWAR MANUFACTURER HW  
 DIODE CALIBRATION 6910 297K  
 AMBIENT TEMPERATURE 71° C

S/N C6983G  
 S/N NVL001  
1.036 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0398 V)

INPUT VOLTAGE 117 V(AC)  
 CURRENT .546 AMPS  
 POWER 53.3 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

# RESTART TEST

COOLER MANUFACTURER	<u>CTI</u>	S/N	<u>C6983G</u>
DEWAR MANUFACTURER	<u>HW</u>	S/N	<u>NVL001</u>
DIODE CALIBRATION	<u>.6910</u> 297K		<u>1.056</u> 77.3K
AMBIENT TEMPERATURE	<u>71°</u> C		

DATA WHEN DEWAR DIODE REACHES 75K (1.0598 V)

INPUT VOLTAGE	<u>108</u>	V (AC)
CURRENT	<u>.553</u>	AMPS
POWER	<u>51.23</u>	WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC	<u>K</u>	
RESTART WITHIN 5 SEC	<u>K</u>	YES <u>    </u> NO
TIME REQUIRED TO RESTART	<u>  1  </u>	SEC

### CYCLE 2

OFF 2 SEC	<u>K</u>	
RESTART WITHIN 5 SEC	<u>K</u>	YES <u>    </u> NO
TIME REQUIRED TO RESTART	<u>  1  </u>	SEC

### CYCLE 3

OFF 2 SEC	<u>K</u>	
RESTART WITHIN 5 SEC	<u>K</u>	YES <u>    </u> NO
TIME REQUIRED TO RESTART	<u>  1  </u>	SEC

### CYCLE 4

OFF 2 SEC	<u>K</u>	
RESTART WITHIN 5 SEC	<u>K</u>	YES <u>    </u> NO
TIME REQUIRED TO RESTART	<u>  1  </u>	SEC

### CYCLE 5

OFF 2 SEC	<u>K</u>	
RESTART WITHIN 5 SEC	<u>K</u>	YES <u>    </u> NO
TIME REQUIRED TO RESTART	<u>  1  </u>	SEC

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**COOLER/DEWAR**

**CTI / TI**  
**(C6979E / 15138)**



# RESTART TEST

COOLER MANUFACTURER CTI  
 DEWAR MANUFACTURER HW  
 DIODE CALIBRATION .6910 297K  
 AMBIENT TEMPERATURE 71.0 C

S/N C6983G  
 S/N NVLO01  
1.096 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0998 V)

INPUT VOLTAGE 117 V(AC)  
 CURRENT .546 AMPS  
 POWER 53.3 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER CTI  
 DEWAR MANUFACTURER HW  
 DIODE CALIBRATION .6910 297K  
 AMBIENT TEMPERATURE 71° C

S/N C69836  
 S/N NVL001  
1.056 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0998 V)

INPUT VOLTAGE 108 V(AC)  
 CURRENT .953 AMPS  
 POWER 51.23 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

# RESTART TEST

COOLER MANUFACTURER CTI  
 DEWAR MANUFACTURER T1  
 DIODE CALIBRATION 6886 297K  
 AMBIENT TEMPERATURE 23° C

S/N C6879E  
 S/N 1513A  
1060 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0639 V)  
 INPUT VOLTAGE 117 V(AC)  
 CURRENT 508 AMPS  
 POWER 46.99 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER	<u>CTI</u>	S/N <u>C6B79E</u>
DEWAR MANUFACTURER	<u>TI</u>	S/N <u>15138</u>
DIODE CALIBRATION	<u>.6886</u> 297K	<u>1.060</u> 77.3K
AMBIENT TEMPERATURE	<u>23°</u> C	

DATA WHEN DEWAR DIODE REACHES 75K (1.0639 V)

INPUT VOLTAGE	<u>108</u> V(AC)
CURRENT	<u>.495</u> AMPS
POWER	<u>44.15</u> WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC	<u>K</u>	
RESTART WITHIN 5 SEC	<u>K</u> YES	NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

### CYCLE 2

OFF 2 SEC	<u>K</u>	
RESTART WITHIN 5 SEC	<u>K</u> YES	NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

### CYCLE 3

OFF 2 SEC	<u>K</u>	
RESTART WITHIN 5 SEC	<u>K</u> YES	NO
TIME REQUIRED TO RESTART	<u>2</u> SEC	

### CYCLE 4

OFF 2 SEC	<u>K</u>	
RESTART WITHIN 5 SEC	<u>K</u> YES	NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

### CYCLE 5

OFF 2 SEC	<u>K</u>	
RESTART WITHIN 5 SEC	<u>K</u> YES	NO
TIME REQUIRED TO RESTART	<u>1</u> SEC	

# RESTART TEST

COOLER MANUFACTURER	<u>CTI</u>	S/N	<u>C6879E</u>
DEWAR MANUFACTURER	<u>TI</u>	S/N	<u>15138</u>
DIODE CALIBRATION	<u>.6886</u> 297K	<u>1.060</u>	77.3K
AMBIENT TEMPERATURE	<u>-54°</u> C		

DATA WHEN DEWAR DIODE REACHES 75K (1.0639 V)

INPUT VOLTAGE	<u>108</u>	V(AC)
CURRENT	<u>.488</u>	AMPS
POWER	<u>42.4</u>	WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER CTI  
 DEWAR MANUFACTURER TI  
 DIODE CALIBRATION .6886 297K  
 AMBIENT TEMPERATURE -54° C

S/N C6879E  
 S/N 15138  
1.060 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0639 V)

INPUT VOLTAGE 117 V(AC)  
 CURRENT .498 AMPS  
 POWER 44.21 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC

RESTART WITHIN 5 SEC

TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER CTI  
 DEWAR MANUFACTURER T1  
 DIODE CALIBRATION .6886 297K  
 AMBIENT TEMPERATURE 71° C

S/N C6879E  
 S/N 15138  
1.060 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0639 V)  
 INPUT VOLTAGE 117 V(AC)  
 CURRENT .571 AMPS  
 POWER 54.69 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

☒ YES ☐ NO  
1 SEC

# RESTART TEST

COOLER MANUFACTURER CTI  
 DEWAR MANUFACTURER TI  
 DIODE CALIBRATION .6886 297K  
 AMBIENT TEMPERATURE 71° C

S/N C6879E  
 S/N 15138  
1.060 77.3K

DATA WHEN DEWAR DIODE REACHES 75K (1.0639 V)

INPUT VOLTAGE 108 V(AC)  
 CURRENT .568 AMPS  
 POWER 51.6 WATTS

## RESTART TEST

### CYCLE 1

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 2

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 3

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 4

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO

### CYCLE 5

OFF 2 SEC  
 RESTART WITHIN 5 SEC  
 TIME REQUIRED TO RESTART

K YES 1 SEC NO



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